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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

WINTER RYE FOR EARLY SPRING FEED.

From the New England Farmer.

The following article, which we copy from the Journal of the Royal Agricultural Society of England, is worthy of attention by many farmers in this country. The length of our winters, and the lateness of the season before our cows and young stock can get a good supply of feed from our pastures, render it very desirable to find some article which may answer for feeding or soiling earlier than any that is in general use among us. Rye is sometimes sown for feed, but when it looks well, the farmer is reluctant to turn in his cattle upon it. But its luxuriance would not be objected to by his stock, and he must get over his compunctions. Our Indian corn crop affords us an opportunity to resort to the rye more conveniently than the English farmer can. We can sow our seed at the last time of hoeing the corn, and the work is done. The great obstacle in the way here is, the fact that our corn in most cases covers only a part of the field, and we cannot feed the rye without turning other lands out to pasture also. With us, unless we go more extensively into the cultivation of turnips, or some other crop that can be sown later than we generally do, we must give up the land to the rye for an entire year. But we think this would be good husbandry for many farmers whose pastures are short.

The article below was based upon English soil and climate—but the necessary adaptations to our circumstances any farmer is competent to make.—ED. N. E. F.

ON EARLY SPRING FEED.

By Matthew M. Milbury.

The increased quantity of stock which the farmer is enabled to keep by the introduction and successful cultivation of green crops requires his best attention to furnish them with a constant supply of green food, especially such portion of his stock as are not intended for fattening. The use of the artificial grasses on arable land in summer, and of turnips in the winter, has been brought as near perfection as may be; but it is quite certain that the wants of the sheep and cattle, from the time when the turnips are consumed to that when the grasses become available, are not equally well provided for. In order, as far as possible, to remedy this deficiency, recourse has been had to the cultivation of turnips which long retain their nutritious qualities, and the Swede has been truly invaluable for this purpose. But while these roots have furnished very palatable and nutritious food for one portion of the stock, they have altogether failed for the young—the principal object of the breeder's anxiety. For as well as having an abundant flow of milk from the dam, every breeder is desirous of training the young stock to help themselves as soon as there is food of a proper quality available for them; and if the young lambs in particular are kept from green food until they are turned into the gross clover leys with their dams, there is great danger that a portion of them will be lost. It is generally desirable to keep the clover leys free at least until May, and long before that time the young stock should be trained to eat a considerable portion of green food.

With the view of supplying this want, several crops have been cultivated for early feed in the spring, with greater or less success, and under greater or less disadvantage, according to circumstances, but the farmer who occupies a poor soil is, more than any other, under the necessity of grappling with the difficulties he may have to contend with; for lateness of vegetation and certain destruction of his crops of grass are sure to be the consequence if he break into them before they attain a proper degree of maturation, and yet he has also the greatest difficulties to surmount in cultivating any spring crop.

The farmer, on the other hand, who cultivates rich fertile land, where he has a deep alluvial soil, growing every crop luxuriantly, can easily free a pasture early in the autumn, and have it full of young grass as early as he may require it, and knows nothing of the difficulties which attend his less favored neighbor.

The avidity with which any new variety of grass or plant promising early growth is tried, indicates how desirable a point it is to secure an early supply of succulent food. At one time it was hoped that this desideratum was discovered in the crimson trefoil.

The winter tare is one of the most valable esculents for stock in possession of the cultivator, and affords the greatest bulk of nutriment of any cultivated green crop, turnips perhaps excepted, and is relished at all seasons and by every kind of stock. It is sometimes resorted to for depasturation in the spring, with a view to subsequent soiling, but it is after all rather a *summer* than a *spring* crop; and it is more than problematical that the injury done to the crop by spring feeding upon it is greater than the amount of spring food thus obtained. If it be worth while to have a supply of early feed, it is worth while clearly to provide a crop specially for that purpose. As a *spring* crop, according to the writer's observation and experience, it is decidedly inferior to other cultivated plants.

The writer of this paper has seen rye-grass very successfully cultivated as early spring feed sown alone. It requires to be sown a whole year before it is fit to consume, and thus lies open to the objection of interfering with good husbandry, particularly the hoeing of the corn crop, with which it is sown a whole year before, as well as preventing the ploughing of the land for the same period; thus encouraging the growth of quitch and weeds, while the adhesion of the soil which it produces, and the accumulation of roots, &c., very materially prevent its kindly working for the crop intended to follow.

The above remarks are made on the supposition that the rye grass is introduced as a half crop, for it must be quite clear to every practical farmer that there is no sound practice in throwing away a whole year's crop for the sake of one month's feed

in the spring, valuable as it undoubtedly is. The trials above mentioned which the writer has seen, have been with Pacey's rye grass, and though the Italian rye grass would furnish a greater portion of food, supposing it tillered as much as Pacey's, which is not the case, yet it is liable to all the above objections, and from the observations of the writer it appears exceedingly doubtful whether it will bear an equal degree of frost to Pacey's.

It is the intention of the writer now to state his experience, and offer his recommendation of a crop embracing all the advantages of the preceding, and several peculiar to itself. It is that of *rye*, eaten in the early stages of its growth. It is intended to intervene between the last crop of the four-course system, which is generally wheat, and to be eaten, and the land ploughed and worked for a crop of turnips. It is equally applicable to all kinds of rotations, and would well precede a fallow or a crop of rape. As it is generally upon farms where the four-course system is pursued that spring feed is most wanted, the writer will confine his observations to that rotation.

So soon as the wheat is cut in the autumn, the plough should be set to work. This may be done even before it is carted, during the mornings of harvest. A single ploughing is given, and a very slight dressing of any kind of short manure. In some cases where the farmer lays on his manure in the autumn, for turnips the ensuing year, it might be better to lay it on before the ploughing. It should be remembered that the slight dressing should not all be considered as given to the rye; in reality it becomes incorporated with the soil, and more intimately mixed with it than by the ordinary mode of spreading it on in the autumn, and any part of it which the rye may abstract, will be more than compensated by the droppings of the stock and the carbonic acid gas which they evolve while consuming it; and which the soil more readily absorbs in the spring than in any other part of the year, evaporation going on at that period to a much smaller extent than in any other.

The seed must be sown upon the plough-seam broadcast, at the rate of 2½ bushels per acre, and if of that year's growth, so much the better, as it is earlier and more certain of germination. To this a peck of rape seed per acre should be added; for although the latter is not able to stand a winter when the frost sets in early and severe, in many cases it will get sufficiently vigorous to resist any ordinary frost, and will much improve the feed in the spring. Should the rape not be sown, a peck of winter-tares per acre will improve the feed, or an additional peck of rye may be added; as a fuller bite and excited growth in its early stages will be secured—a point gained when wanted to depasture, although it might be injurious if sown for a crop.

In cultivating rye as feed there need be no fears entertained of its becoming "winter proud," for as that only affects the ears of the corn, it is a circumstance of no importance, and therefore the earlier it is sown the better able it is to resist the early frosts, as well as having a better cover and more feed when wanted. When sown it should be thoroughly harrowed, but not rolled—a *double* with a pair of fine harrows is sufficient, and the surface weeds should be gathered off, or the whole raked with the hand, which will more efficiently cover the seed. An advantage is gained to the soil by this plowing, which cannot be obtained when the land is sown with the vetches. The annual weeds on the old surface are prevented from running to seed, and a new surface is exposed to the air and frost.

The rye will be fit for consuming the last week in March or the first in April, or if allowed to remain until the middle of the latter month, it will carry a greater quantity of stock. After it is thoroughly eaten up, it should be freed, and by the first week in May, will afford another pasture of fine young nutritious feed; at least, in ordinary seasons. It is bad management, though sometimes practised, to allow the rye to remain uneaten until the seed-stalk begins to shoot, for in that case it will become much less palatable and useful. By consuming it young, it is much more valuable, and the succession crop equally so as the first.

The second crop being consumed, the plough must be put into operation, and the soil prepared for the succeeding crop; and the advantage of its cultivation, by no means a small one, is, that it interferes with no other crop.

Perhaps a short digression may be pardoned on the subsequent preparation of the soil. The writer's practice is different to that of most other persons. Usually it is cross-ploughed a fortnight after its first ploughing. Time is thus lost, and the slices are cut into squares difficult to be acted upon by the harrow. The writer begins to harrow as soon as the newly turned up surface of the first ploughing is sufficiently dry. This brings up the lowest part of the roots of the weeds and closes the interstices of the furrows, so that the remains of vegetation being covered, deprived of air, and gathering moisture, begin to decompose. Instead of cross-ploughing, it is again ploughed lengthways, and the old surface again brought up and harrowed. The weeds separate much more easily by this process, and much time and labor is saved; the same practice is applied to bastard fallows with the same good effects.

Rye has the decided advantage of being capable of resisting *any conceivable* degree of frost, and when even the hardy wheat is carried off by an ungenial season, it will escape injury, and even thrive. At this time (Feb. 21, 1840) the writer has a plot growing for feed which would now afford more eating than almost any mixture of artificial grasses in the middle of April, and that on a thin light soil not worth more to rent than 25*s.* per acre. Some of the rape has succeeded, even in this season of incessant rain, which prevailed not only in the early stages of its growth, but ever since it was sown. It can bear so much and constant wet, worse even than frost.

The expense of this crop will be somewhere as under. Say per acre—

2½ bushels of rye at 4*s.* 6*d.*	11*s.* 3*d.*
½ peck of rape,	0 10½
	12 1½

It should be remembered that this interferes with no operation of husbandry, and prevents no crop, so that no rent of land or other extras are to be reckoned—the ploughings would be nearly the same if the rye were not sown. Nothing is better relished by stock at the season when it is intended to be used; a guide by no means unsafe as to its nutritious qualities, and which is borne out by the condition of the stock feeding on it.

To recapitulate the advantages of its cultivation:

1. Provision of excellent green food is made at a season of the year when of all others it is most wanted.

2. It is produced without sacrificing any portion of the usual rotations pursued on a farm, and with little extra labor, nor does it interfere with the management of any preceding or succeeding crops.

3. It will grow on any soil, but is especially calculated for poor loose sand, when every other green esculent is more or less uncertain.

4. It will bear any degree of frost to which our climate is subject, and is sufficiently hardy to defy the effects of the coldest situations in the country, being there cultivated instead of wheat for a corn crop from necessity.

5. It is as inexpensive, or more so than any grass or leguminous plant.

6. It is readily consumed by stock, especially young animals.

7. It improves rather than deteriorates the soil upon which it is grown.

Thorpfield, near Thirsk, Yorkshire.

THE WILD HOGS OF THE NORTHERN PARISHES OF LOUISIANA.

From the Western Farmer and Gardener.

Dear sir—Presuming a short account of *hogyology*, (if I may be allowed to coin a word,) in the swamps of Louisiana, may not be entirely unacceptable to some of your numerous readers, I have concluded to scribble you a few lines on that subject. The settlements on the level or low lands are usually along the margins of rivers, lakes and bayous, there usually being a belt of land from a quarter of a mile to two miles in breadth, which is arable and rarely subject to overflows; as you recede from these into the still lower lands that are almost annually inundated, you find yourself (unless during a flood of the "Great Father of Waters") in open woods entirely clear of bog or morass, occasionally checkered, here and there, with a cane brake on the most elevated spots, and then again with palmetto, sometimes in small patches, and again extending for miles, varying in height from two to eight feet on the lowest parts of the swamp. The timber in these lowlands is composed of fifteen varieties of oak, swamp-hickory, persimmon of two varieties, pecan, &c., some of which rarely ever fail in producing an abundant mast. On the most elevated ridges we have a variety of grape vines, bamboo, two species of the vine producing the trumpet-flower, the green-brier, and many other kinds of vines that entwine their pliant folds around every tree within their reach, and render the spot entirely impenetrable to a horseman. In the open parts of the swamp (for in the south all land is called swamp that is or ever has been subject to overflow) where the timber is scattering, there are several varieties of the grapes which are peculiar to these swamps, and also many weeds and flowers that are in bloom during the winter months. These low lands are not arable, and never will be, as the lowest of them are the reservoirs not only of the Mississippi floods, but are also the receptacles for the overflows of the Arkansas, the Onachitta and Red river—the breadth of these inundated lands is from 10 to 40 miles. Here then is our wild hog range.

The wild hogs are usually three or four years in coming to maturity, and frequently weigh from two to three hundred pounds, gross; their color is various: black, white, sandy and pale red, and every variety of mixture which these colors will admit of; their form is ordinary, having rather too much leg, which makes them quite *heely* at times; rather slab-sided, with a roached back, well set off with long stiff bristles, which, when elevated in battle array, give them quite a formidable appearance; there is, however, much variety in the form and size of these hogs, as they are crossed and recrossed by new recruits which stray off to them in search of mast, or fall in company with them in their rambles near the plantations; hence you occasionally see some of them that might pass for a distant relation to a Berkshire, and again you come across one whose whiteness, and whose rounded hams would say that some of his ancestors had had a letter of introduction to a grazier from the land of St. Patrick. The wild hogs subsist on a great variety of food; in the fall and winter months they fare sumptuously on the great variety of mast which the oaks, persimmons, hackberries, pecan and palmetto yield, together with the grape that contributes its beautiful clusters in great profusion. In the spring and early in the summer months their fare is frequently scarce, and they are frequently driven by high water and hemmed up on the more elevated parts of the swamp, that are covered with cane; they then subsist on young cane roots, the roots of the blackberry, or dewberry, and the wild potato—at this season they usually become quite poor. As the water subsides they fare very sumptuously on fish of every description that have been entangled in the vines, thickets, and cane brakes by the sudden falling of the water. Shell fish of various kinds, such as the loggerheaded turtle, the soft shell, the common terrapin, craw-fish, and shrimps add to their bill of fare, and make up quite a variety of fishy food.

The wild hogs usually feed in the day-time, unless they are frequently hunted, in which case they feed in the night, and conceal themselves during the day in brier thickets, cane brakes, and sometimes in large hollow trees and logs, which are favorite haunts for them in the winter months.

They usually live together in small numbers—sometimes as many as fifteen or twenty old hogs, with their yearling shoats and pigs, generally numbering sufficiently strong to repel the assaults of the wolves, which are very numerous, and in consequence of their numbers, their most troublesome enemies. The wolves never attack them openly and boldly, but follow after them, and conceal themselves until a favorable opportunity occurs; then they seize a pig or shoat that has carelessly strayed at some distance from the old hogs; for at the first squeal, the old hogs make a furious charge, en masse, while the young cluster in the rear, until their enemies have been beaten off, when they all retreat at the first favorable opportunity. Their sense of smell is much more acute than any person would suppose, who has been acquainted with his swineship in a domestic state only. They can smell a man, who happens to be to the windward of them some one or two hundred yards, when there

is any current in the atmosphere; and when they are feeding in the open woods, they are generally on the "qui vive." And in passing, let me say that these long-faced gentry have not had their eyes stuck above their lantern jaws to no purpose. Their senses of smelling and seeing are acute, and hence a still damp day is usually selected for hog hunting. They often display a good deal of cunning in concealing themselves; for when in the thickets or cane brakes, they will squat, and you may ride within thirty feet of them; and if neither the hunter nor dogs discover them, they will lie close to the ground, until they think they have been discovered, or until their pursuers have passed by. It is common for deer, similarly situated to do the same.

The month of January is the most usual time for hunting the wild hog, as he is usually fatter at that season than at any other time of the year; and the weather being cooler, is better adapted to preserving his flesh. Hounds are occasionally brought in requisition in hunting these animals, but they are objectionable, as their noise gives the hogs early notice of the approach of the hunters; and taking the advantage of such a start, it is difficult to overtake them, as they are equal to a four mile horse in a long-winded chase, particularly if the chase happens to be through heavy cane-brakes, green-brier thickets, and cypress ponds, and these are favorite retreats.

The dogs most suitable for hunting wild hogs are able-bodied, active curs, that take the trail, and follow it up silently, until they come up with the hogs, when they bring them to a bay by barking at them; and if they do not stop, they seize one, which immediately causes them to "*rally*," when the dogs in turn retreat a short distance, separate, and by occasionally seizing and again retreating and barking, they occupy the attention of the hogs until the hunters have time to ride up, select each one the largest hog, and shoot them down, at which time the hogs make an attempt to escape, but the dogs again overhaul them, and again the hunters thin out their numbers, until they have killed as many as they can conveniently manage, when they return home; and the remainder of the "gang" make their way to other neighborhoods, but usually return in the course of a few days to their wonted range, and again, at a suitable time, encounter the same scenes of extermination.

Hog hunters usually shoot off of their horses, if the woods are sufficiently open to admit of it, as it is occasionally dangerous to approach on foot; in fact, horses are sometimes crippled by these hogs, for an old wild boar is as furious and dangerous as a bear, particularly if he has been shot at and crippled, and been much harassed by the dogs.

The wild hogs of the swamps, although they cost neither care nor cash, are a great pest to the planters, for by frequenting the range of the gentle hogs, they soon impart their wild nature to them, and if they are not closely attended to, they soon quit the plantation, to return no more.

The Berkshire and Grazier are destined ere long to supplant these worthless creatures, that require more labor to hunt them than they are worth. We are getting wide awake on the subject of hogs, and we will not desist till we have stocked our range with the broad backed Berkshire. Respectfully,

HENRY J. PECK.

Sicily Island, La., May 1st, 1842.

VARIOUS KINDS OF FORAGE CROPS.

Translated from "Le Bon Jardinier" for the Farmers' Register.

Bunias d'Orient, Rocket, Bunias orientalis.—The want which we have experienced, in our agriculture, of a green food in March and April, has directed attention to the rocket. Thounin and Arthur Young have recommended it on this account, as well as for its abundance and good quality. I have observed it in gardens in full vegetation in March, and exceedingly foraginous. But M. Charles Pictet, of Geneva has informed me that the rocket placed in the fields has not answered his expectation; in like experiments I have not found it more early, but perhaps less so in the commencement of spring than the wild chickory, but in April it affords a very vigorous vegetation and an abundant pasturage. In 1818 it exhibited a very valuable quality, that of resisting entirely a severe drought. More frequent experiments with this plant would be quite interesting. In small attempts the rocket should be sown in plant beds, and from thence planted at eight or ten inches apart. If its culture is extended, it may without doubt be sown with success where it is to remain, for it will even reproduce itself by its seed. It is a plant of considerable longevity.

Chickorée sauvage, Wild chickory, Cichorium intylus.—A productive and early grass, well calculated to withstand a drought; very useful as pasturage or to be given green in the stable; it is excellent for cattle, sown half and half with red clover; it will succeed well in stiff or light lands, provided there is some depth of soil. It is generally sown in the spring, broadcast, either alone or with barley or oats, at the rate of 24 pounds to the hectare. It may be sown in September. It lasts three or four years. A variety, the *Chickorée sauvage à café*, has long thick roots like the white carrot. They use it in the manufacture of chickory coffee, but advantage is also derived from it as a food for beasts, particularly hogs, which eat heartily of the roots, more hard and fibrous than those of the ordinary variety. The roots do not freeze, and will resist the winter in the ground, which is important; the plant is also more vigorous, and the leaves larger than those of the common wild chickory, and it is probably as a forage not inferior to it. Sown a little thin, it furnishes excellent roots, and may be cultivated with the spade and hoe.

Chou à vaches, [*Cow*] *Cabbage, Brassica oleracea vaccina.*—Every where is the utility of the cabbage as food for cattle known; but it is only in some locations that it is planted solely for that purpose, for which it deserves to be more generally used. Among the varieties which are fitted for it, the *chou à vaches* appears to be the best, at least for fertile lands, on account of its considerable height and the size of its leaves. They cultivate it extensively in the most of our western departments. All cabbages prefer a good soil, rather stiff than light, and well manured. They sow the *chou*

à vaches, and the other large varieties, in plant-beds in March and April, or in July and August, they replant them where they have attained sufficient size, the first of April or May, the second from September to November, in rows about three feet apart, and between two and three feet distant in the row, the space varying with the variety and the fertility of the soil. Whilst they are growing the ground is kept clean with the hoe. The cabbage yields its product of leaves in the spring of their second year from being sown. The *caulet* of Flanders, cultivated chiefly in the environs of Lille, is very similar in its appearance, its height, and its product to the chou à vaches. The *chou branchée* or *mille-têtes* of Poitou is the variety which they prefer to cultivate about Chollet for the fattening of cattle; it is less tall than the *chou à vaches*, but it is at least as productive; it is furnished from the foot with numerous strong shoots, which give it very much the appearance of a thick shrub.

The *chou vivace* of Daubenton is like the preceding, but its lateral stalks, more particularly those situated near the lower part of the trunk, grow to a considerable length, and often bend themselves and form an elbow on the ground, where it puts out roots. This has caused Daubenton to call it *chou de bouture*, (the cabbage of suckers.) It stands the winter's cold very well, and was one of the few varieties which supported the severity of 1830. These different varieties, with all those that may be properly called green cabbages, are cultivated all in the same manner, and are but little sensible to the cold. Six or eight ounces of seed will furnish enough plants to set out an acre.

Chou arbre de Laponie.—M. Madiot, director of the gardens at Lyons, has recommended under this name a cabbage which he says will last 8 or 10 years, resist all extremities of cold, and yield a great quantity of produce. In many comparative experiments, this variety has appeared so much to resemble the *chou à vaches* that we think it cannot be distingushed from it. The winter of 1830-31 destroyed both.

Chou frisé vert du nord, and *Chou frisé rouge du nord*, *Brassica oleracea fimbriata.* These two varieties are very much cultivated in the north of Europe. They differ from the preceding varieties, in having their leaves pinnatifid, which renders them less productive. But they have in their favor the advantage of being much more hardy. The winters of 1830 and 1832, present a remarkable proof of this fact; they supported them almost without any alteration, (the *frisé rouge* especially,) whilst the *chou à vaches* and the Poitou, and most others were destroyed.

Chou-navet, *Chou-turnep*, *Chou de Laponie*, *Brassica*, *Napo-brassica.*—Its produce consists chiefly in its plump root, which is like the turnip, and one of its most valuable qualities is that it resists the cold almost entirely. They usually cultivate it in the same manner that they do the other kinds, with the difference that it is better to place the plants nearer together. They also obtain very fine roots by sowing them where they are to stand, either in rows (which is the best way,) or broadcast.

In either case they sow them so that they may be thinned, leaving the plants about twelve inches apart. It should be sown at any time from April to June, at about 4 pounds of seed to the hectare.

Chou ruta baga, *Navet de Suéde*, *Brassica.*—This plant, introduced into France in 1792, was known in England a few years before, where it is now most extensively cultivated. It resembles very much the *chou navet*, with which M. Sonnini has *mal-à-propos* confounded it, for they are entirely distinct plants. The ruta baga can be transplanted, but it is best to sow it where it is to stand, (or rather to grow.) It is best to sow it in rows, and to let it have the same space with the *chou navet*. It attains maturity more rapidly than that, and is about one month more early. Both accommodate themselves better than the large cabbages to light and indifferent lands, but they prefer them good and manured. The ruta baga will resist much cold, and may be kept in the fields during the winter, to be taken up only when there is need for them, but I have frequently remarked, that great humidity and alternate freezing and thawing, was more injurious to them than to the *chou navet*, this defect, however, is counterbalanced by the beauty and neatness of its roots. Both afford valuable resources for food for horned cattle and sheep, to which they are given when cut up. The *chou-navet*, and the large cabbages are cultivated still in some counties as food for cattle.

Chou colza, *Brassica oleracea campestris.*—It is chiefly for the oil which is obtained from its grain that the *chou colza* is cultivated. This oil is a great object of commerce in Flanders, Belgium, &c., but it answers also for food for cattle. For this use it may be transplanted into rows as the other green cabbages; but the best manner appears to me to be that adopted by M. Yvart, which is to work the stubble fields immediately after harvest, with a plough or heavy harrow, and then to sow the seed at about ten pounds to the hectare. This plant will get through an ordinary winter without damage, and will, at the end of that time, furnish either pasturage or food to be fed away green in the stable, both of which will be valuable from the season at which they come in. All of the hardy cabbages, and still better the ruta baga and the *chou navet*, can be thus used; the only particular advantage that the colza has in this respect is the small expense at which the seed may be obtained.

Cultivation of the colza for grain.—The method above described is only proper when the colza is to be used as green food in the spring; when cultivated for the grain more care is necessary. From the middle of July to the last of August, they sow it in beds well prepared, and in six or eight months they transplant the young plants into ground equally well prepared and manured, placing them one foot apart each way. They plant them thus on beds of twelve feet in width, leaving between these beds intervals of two or three feet unplanted, from which intervals earth is obtained later in the season, to place about the feet of the plants. If one desires to work between the rows with the cultivator or skimmer, it is necessary to increase the distance to eighteen inches or two feet. It is essential to gather the seed so soon as a large majority of the pods have attained almost to maturity, else great loss will be experienced by shattering. Sometimes the colza is sown, where it is to stand, broadcast; but it is then necessary to thin them with the hoe. What I have said is applicable to the common winter

colza. There is a spring variety, the *colza de Mars*, which, sown in March and April, ripens during the same summer, a quality very remarkable in a cabbage. This variety is not so much in cultivation as the common kind.

Millefeuille, Milfoil, Achillea millefolium.—This plant, being little productive, and not calculated for the sickle, has only a secondary rank in the list of plants for forage, yet under certain circumstances it can be rendered extremely useful. It affords good pasturage for sheep, and has the merit of withstanding the effect of a drought, even on the most arid lands. It is extremely probable that proprietors of sheep, particularly in the middle of France, would find in the culture of the milfoil a valuable resource for food for their cattle in the summer months. This plant is long-lived. It should be sown in the spring, but will, without doubt, succeed if sown early in autumn. It grows more commonly in the hard and dry clay lands, than on those which are of a light and sandy nature. From ten to twelve pounds of seed to the hectare.

Moutarde noire, Black mustard, Sinapis nigra, and *Moutarde blanche, White mustard, Sinapis alba,* are cultivated chiefly for the seed, of which is made the condiment of the same name. They sow it, however, (particularly the white,) to furnish green food to the cows for the end of summer. For the first purpose, they select good, deep, fresh land, and sow it rather thin in the spring. For the second, the white mustard is preferred, and they esteem it so much that in many cantons it is called *plante de beurre*, (butter plant.) The usual mode of treatment is to sow it on the stubble fields immediately after the harvest, having first given it a slight working by means of scarifying it with a harrow. This seed, if the season is favorable, grows rapidly, and affords food for the cattle until the cold weather sets in.

Navette, Rabethe, Rape, Brassica, Napus silvestris, serves for forage when sown on the stubble lands after harvest, at the rate of twenty pounds of seed to the hectare. We know some farmers who for this purpose prefer it to the white mustard; but its chief value is its oleaginous grain. For this object they sow it from the last of July to the first of September, generally broadcast, on land prepared by many workings. They sometimes sow it in rows; they work it, or rather weed it, and thin the plants. The ensuing summer they gather the grain when the larger proportion of the pods is yellow, but before it is completely mature, for then there will be a considerable shattering. The variety which is thus cultivated is the common or winter rape. There is a kind called the *navette d'eté*, or *quarantaine*, which is sown in the spring, and matures itself the same year. It is less productive than the ordinary variety, but it presents the advantage of supplying the place of the other oleaginous plants, should they be destroyed by the winter's frosts. They sow about six pounds of the seed of the winter, and eight pounds of the summer rape to the hectare.

Pastel, Woad, Isatis tinctoria, considered as a plant for forage, is valuable only on account of its extreme precocity. Winter only arrests its vegetation during periods of the severest cold, and in March, and sometimes February, it is considerably developed. If it were more sought after by the cattle it would be one of the most valuable resources of the farmer; but, unfortunately, it is wanting in this respect. I do not think, however, that this point has been sufficiently examined into. I know of no attempt with the woad to nourish horned cattle during the winter, and the authorities both for and against its fitness for sheep are nicely balanced. I think therefore that new researches into this subject would be highly useful. We should not renounce the advantages which the winter vegetation of the woad offers, without an entire conviction of its inutility. If cultivated for forage, this plant should be sown broadcast in a soil rather dry than moist. It may be sown in the spring or in the end of the summer at about forty pounds to the hectare. Cultivated for the dye, the woad requires a good soil, well prepared and manured, and in this case they sow it in rows, the intervals between which are carefully worked.

Many years' culture and use of the woad, since the above article was written, have proven to me that sheep, cows and oxen will eat it most readily when it is green. I am not prepared to speak of its nutritious qualities, having used it only concurrently with other kinds of food. I have fully satisfied myself that it grows with great facility on indifferent and dry lands, and even on those that are very chalky. This quality, together with its precocity, has induced me to think it a very valuable plant, and one from which much advantage is to be derived.

Pimprenelle, Burnet, Poterium sanguisorba.—The great merit of this plant is that it furnishes excellent pastures on poor and arid lands, whether they are sandy or chalky. It resists extremes both of cold and drought, and affords particularly a valuable resource for the support of sheep during the winter. In some parts of Champagne they have, by the culture of the burnet, produced a sensible amelioration in the state of their agriculture, an amelioration of which thousands of acres in France would be susceptible. On the good lands it is relatively less advantageous, although its vegetation there is so luxuriant as to permit the sickle. By the testimony of many practical men its hay is not good, either for cows or horses, but solely for sheep. Yet I think that on all farms where they keep a flock of sheep during the winter it would be well if good land can be spared for the purpose to have one or more pieces of burnet for their winter grazing. It can be very useful in furnishing, in the summer, green food to use in the stable; it throws out fresh shoots at this season, perhaps more quickly than any other plant, and the green forage suits all animals. The usual time for sowing the burnet is the spring, but the month of September will answer as well on light lands. Sixty pounds of seed to the hectare are requisite.

Spergule, Corn spurry, Spurgula arvensis, is an annual forage, particularly suited to fresh sands, and furnishes an excellent food for cows. In a part of the Low Countries, where the spurry is very much grown, the butter of the cows which are nourished upon it is esteemed of a superior quality, and is called *beurre de spergule.* They sow it generally in the summer, on the stubble fields, after breaking them up by a light working immediately after harvest. They either graze it, or feed it green in the stable, a resource which lasts until frost. Sometimes they mow it, and then it must be sown early; but it loses a great deal in

curing; a defect owing to the aqueous nature of the plant. I find the spurry spoken of in many works as good for fowls, but I have frequently seen them refuse to eat the grain. This grain is very minute, and should be but little gathered. They sow about twelve pounds per acre. The spurry, turned in green, is spoken of by many theoretical farmers (*agronomes*) as one of the best of the ameliorating plants.

WHITE SLAVERY IN GREAT BRITAIN. EMPLOYMENT OF FEMALES IN THE ENGLISH MINES.

From the Plough Boy.

It appears that the employment of females in the coal mines is chiefly confined to Yorkshire, Lancaster, Cheshire and the east of Scotland and South Wales; and the revolting cruelties practised on boys, as detailed in our first notice, is equally extended to girls. In fact, not only are girls preferred as "hurriers," for their greater docility, but they are taken in the mines at even an earlier age than boys, from a supposition that when infants they are the most "cute" of the two. It is distressing to read the accounts which some of the tender females themselves give of the hardships they undergo. One says, "I work in Hardhill mine. We hurry the carts by pushing behind, but I frequently draw with ropes and chains as the horses do. It is dirty, slavish work, and the water quite covers our ankles. I knock my head against the rocks, as they are not so high as I am, and they cause me to stoop, and makes my back ache." Another gives the following dreadful description of what they have to undergo. "My employment is carrying coal. Am frequently worked from four in the morning till six at night, and every other week I work night work. I then go down at two in the day and come up at four or six in the morning. Two years ago the pit closed in upon thirteen of us, and we were without food and light two days; nearly one day we were up to our chins in water." Our space will not permit us to multiply such extracts; and we must therefore content ourselves with stating generally that there is no variation in any part of the voluminous evidence collected on this subject of young girls being employed in coal mines, except that their labor is more severe, and treatment more cruel, if possible, in the east of Scotland than elsewhere.

Nor are young, or even married women, much better off than the girls. Anne Harris, aged 15, "heartily hated it. It was no woman's work, nor is it good for any body; but I am obliged to the work, as father howks (hews) the coals below." Janet Duncan, aged 17, "was a coal bearer at Henmuir pit. The carts she pushed contained 3 cwt. of coals, and it was very severe work, especially when they had to stay before the carts to prevent their coming down too fast; they frequently run too quick and knock us down. Is able to say that the hardest day-light work is infinitely superior to the best of coal work." Margaret Drysdale, aged 15, "did not like the work, but her mother was dead, and her father took her down, and she had no choice. Her employment is to draw carts, and she had harness or drag ropes on, like the horses." One more. Katharine Logan, aged 16, "began to work at coal carrying more than 5 years since; works in harness now; draws backward with her face to the tubes; the ropes and chains go under her pit clothes, (which consist simply of a pair of boy's trousers;) it is o'er sair work, especially when we had to crawl." We can imagine no sight more horrible than young girls harnessed to carts, and drawing them on all-fours through confined passages, perhaps not two feet high, and frequently a foot of that space a thick sludge of water and coal dust; nor can any one form an adequate idea of it without inspecting the plates which represent it in the parliamentary report.

Well may the report say, that "when the nature of this horrible labor is taken into consideration—its extreme severity—its regular duration of from 12 to 14 hours daily—the damp, heated, and unwholesome atmosphere of a coal mine, and the tender age and sex of the workers—a picture is presented of deadly physical oppression and systematic slavery, of which I conscientiously believe no one unacquainted with such facts would credit the existence in the British dominions."

Married woman are chiefly employed in filling, riddling, and carrying, and the labor imposed upon them is excessive. The reason given by one witness (herself married) why they undertake such work at all is, "that if the women did not work below, the children would not go down so soon." The same witness says that she wrought till a stone 14 months ago so crushed her leg and foot that she could not gang; and that the oppression of coal bearing is such as to injure them in after life, few existing whose legs are not injured, or else their haunches, before they are 30. What other troubles married women undergo from an occupation so unnatural for them, will be seen from the following brief abstracts:

Jane Johnson, aged 29—"I could carry two hundred weight when 15 years of age, but now feel the weakness upon me from the strains. I have been married nearly 10 years and have had four children, and have usually wrought till within a day of the child's birth. Many women lose their strength early from overwork, and get injured in their backs and legs."

Jane Peacock, aged 40—"I have wrought in the bowels of the earth 33 years. Have been married 23 years, and had nine children, two still born, and they were so from oppressive work. A vast number of women have dead children and false births, which are worse, as they are not able to work after the latter. It is only horse work, and ruins the women, it crushes their haunches, bends their ancles, and makes them old women at 40."

Isabel Wilson, aged 38—"When on St. John's work I was a carrier of coals, which caused me to miscarry five times, from the strains, and I was very ill after each."

Elizabeth M'Neil—"I knew a woman who came up, and the child was born in the field next the coal hill. Women frequently miscarry below, and suffer after."

Jane Wood—"The severe work causes women much trouble. They frequently have premature births. My neighbor Jenny M'Donald has lain ill for six months, and William King's wife lately died from miscarriage, and a vast number of women suffer from similar causes.

Indeed, all the married women, and there were many examined, relate their experience to the same purport, and it may be asked without exaggeration, whether such a system can be regarded as any thing less than murderous. It is not for us in this place to assign where the blame lies, but we cannot forbear inserting a significant passage from the evidence of another, Margaret Bextet. "The work," she says, "is not fit for women, and the men could prevent it if they labored more regular. Indeed, men about this place don't wish their wives to work in the mines, but the masters seem to encourage it—at any rate, the masters never interfere to prevent it."

But revolting as all this is, there is something still more so behind. The demoralization of the females, old and young, is greater even than their oppression. We should hardly venture to describe its extent except in the words of the commissioners themselves, and that as briefly as possible.

"In the southern parts of the west riding of Yorkshire," says the report, "as far as relates to the underground employment, there is no distinction of sex, but the labor is distributed indifferently among both sexes, except that it is comparatively rare for the women to hew or get the coals, although there are numerous instances in which the women regularly perform even this work. In great numbers of the coal pits in this district the men work in a state of perfect nakedness, and are in this state assisted in their labor by females of all ages, from girls of six years old to women of twenty-one, these females being themselves quite naked down to the waist."

The extreme indecency remarked in this passage we should infer (from Appendix, part 1, page 181) to be confined to the Flockton and Thornhill pits; but in all of them it prevails to a degree very slightly mitigated in shamelessness. In none do the men wear any other dress than a flannel jacket, or the females add to the breeches, which they wear as a protection against the galling chain which passes from a girdle round the waist between their legs to the load they are drawing, more than a loose ragged shift; and these two very slender improvements are rarely remarked together in the same district. In fact, "the girls are not a bit ashamed among their own pit set," and in the neighborhood of Halifax the practice seems to reach a climax positively disgusting. Mary Barrett, aged 14, told the sub-commissioners that "she always worked without shoes, stockings or trousers, wearing nothing but a shift. She had to go up the headings with the men; they are all naked there; she had got well used to it, and did not care much about it now, but at first was afraid, and did not like it."

We are sorry that the magnitude of the evil compels us, even so briefly, to enter into such details of it, nor must we suppose that the women merely discard all modesty on entering the mouth of the pit. Though the words we have quoted would seem to refer to their conduct under ground, abundance of evidence is scattered through the report that they have not much more delicacy in their recreations and occupations above ground than in their labors below.—The men meet to fight and wrestle in complete nudity, except their clogs; and though the women affect finery when they are "holidaying," they are not at all shy of such exhibitions, nor at any time sensitive about appearing half naked themselves.

"All classes of witnesses," says the report, "bear the strongest testimony to the immoral effects of the practice of females working in mines," "I wish the government," says one witness, (a collier,) "would expel all girls and females from mines. I can give proof that they are immoral; and I am certain that the girls are worse in point of morals than the men, and use more indecent language." "It is impossible," says another, "for girls to remain modest who are in pits, regularly mixing with such company and hearing such language as they do. I have worked myself in pits for above ten years, where girls were constantly employed, and can safely say that it is an abominable system." "Where girls are employed," is the testimony of Mr. Ellison, of Berkinshaw, "the immoralities practised are most scandalous," and Mr. Sadler, surgeon of Barnsley; whose profession enables him to know intimately the habits of the miners around him, confirms it in these striking words—"I strongly disapprove of females being in pits; the female character is totally destroyed by it; their habits and feelings are altogether different; they can neither discharge the duties of wives or mothers. It is a brutalizing practice."

Thomas Wilson, esq., of the Banks Silkstone, and owner of three collieries, though satisfied that "the employment of females of any age in mines is most objectionable," is nevertheless of opinion that it would be impossible for any individual to put an end to it. "I should rejoice to see it put an end to, but in the present feeling of the colliers, no individual would succeed in stopping it in a neighborhood where it prevails, because the men would immediately go to those pits where their daughters are employed." Of the correctness of this opinion, however, there may be some doubt. The mischief seems to have arisen from the practice of the masters (for some reason or other,) allowing the men to find their own drawers and hurriers. "Mr. Hilton, of Wigan," says Mr. sub-commissioner Kennedy, "told me that he should be glad to discontinue the employment of females in his mines; but that it was a custom for the men to find their own drawers, and that the masters did not interfere." Why they do not interfere is not shown. They have interfered in other districts, and with the most happy results; for we find that from all the mines in the vast coal fields of Cumberland, Durham and Northumberland, there is now an "absolute exclusion of all female workers, except in one old colliery belonging to the Earl of Lonsdale."

We may conclude this branch of the subject in the words of sub-commissioner Symonds, that "under no conceivable circumstance is any one sort of employment in collieries proper for females; and that the practice is flagrantly disgraceful to a Christian as well as a civilized country."

RISKS OF MERCANTILE LIFE.

General Dearborn, in a lecture delivered last winter before the farmers of the Massachusetts legislature, declared that 97 out of every 100 persons who obtained their livelihood by buying and

selling, *failed* or died insolvent. This fact he ascertained by reference to the books of the custom-house, the banks, the probate office, and from the recollections of the oldest merchants. If this statement approximates to the truth in relation to the risks of mercantile life, it should induce fathers to instil into the minds of their sons a love of agricultural pursuits. Gen. Dearborn declared that he would prefer a cottage in the country with five acres of ground, to the most splendid palace that could be erected in the city, if he must depend upon the success of merchandise to support it."—*Ohio State Journal.*

A DANGEROUS PROPERTY OF WOOD ASHES EXPOSED, AND SOME OF THEIR OTHER PROPERTIES EXAMINED.

By Dr. John T. Plumer, of Richmond, Indiana.

From Silliman's Journal of Science and Arts.

I have recently devoted some time to a further examination into the properties of wood ashes, and especially into that property by which heat is conveyed from a small space on their surface deeply into the interior of the largest masses. I consider the subject of sufficient importance to claim the attention of the general as well as the scientific reader; for I cannot forbear thinking, that at least some of the mysterious conflagrations which are repeatedly occurring are chargeable to this hitherto unsuspected cause.

Judging by the remarks of Prof. Hubbard, accompanying two cases of combustion in wood ashes, reported by him in a late number of this journal,* it appears to be his opinion that the caloric in question was generated within and near the bottom of the heap, by a spontaneous but unknown process. I conceive that the following experiments render this opinion highly improbable, and they go to sustain the view taken by the present writer, so far as it respects the origin of the caloric, and perhaps measurably as it regards the means by which the heat is diffused throughout the ashes. They show that the heat-retaining power is not peculiar to ashes, but is common to various pulverulent substances; that this residue of combustion contains an appreciable quantity of charcoal in a state of minute division; and, as formerly stated, that it is unsafe to deposite hot ashes upon, perhaps, the largest heaps of cold ashes. I shall marshall these experiments under the head of

Ignitibility of wood ashes.—1. A pint of sifted ashes was made into a conical heap four inches high, upon a folded newspaper, and a coal lighted at one corner only, was laid upon the summit and very slightly covered. In seventeen minutes the coal was examined and found to be wholly ignited. It was again covered, and in eleven minutes afterward, that part of the paper on which the ashes rested became quite warm, and also the board beneath it. On sliding the paper nearly off the board, and gently bending it convexly upwards, I succeeded in producing a fissure, extending from the apex of the cone downward to a considerable depth. By this means I was enabled to see the interior of my diminutive volcano, and to discover that the ashes within were *red hot*, if not incandescent, as far down as the fissure extended. After this peep, I closed up the crater by sliding the paper back upon the board, and waited an hour from the beginning of the experiment. At the expiration of this period, the coal was not wholly consumed, and the ashes were still quite warm.

The coal used in the foregoing instance was of sugar-tree wood, and at the time it was placed upon the ashes, two other coals, one of sugar-tree and the other of beech, were thoroughly ignited and laid upon a board. In two minutes the "fire went out" of both these coals.

2. A wooden pill-box of the largest size was filled with sifted ashes, and an oak coal weighing seven grains was barely buried in them. In thirty five minutes the box was very warm all over; and at this time I surrounded it with cold ashes. In twenty minutes more, the ashes within and immediately around the box were uncomfortably hot.

3. I renewed the second experiment, with the exception of not wholly covering the box. The edge was left exposed, to ascertain whether it would not act as a vent to the accumulating caloric. In half an hour I examined the coal, and found it extinct and the ashes cold. The coal in this case was of beech.

4. This beech coal lighted at one corner, was placed on a cone of sifted ashes, as in the first experiment, and in twenty minutes it was thoroughly ignited. I now pressed a cylinder of pasteboard perpendicularly into the ashes, so as to include the coal and most of the heated ashes. The upper edge of the cylinder was left uncovered. I did not examine the coal for an hour; it was at that time not consumed but dead, and the ashes were entirely cold.

5. I built a cone of a quart of pale ashes and deposited eight or ten dead coals some distance apart, near the base and remote from the surface; at the apex I buried a live coal as before. In three quarters of an hour, stiff paper or a splinter of wood thrust into the centre of the heap took fire; and on demolishing the pile, I found that the heat had descended to the coals below, and ignited them; indeed they were partially consumed, and the whole interior of the base of the cone was extremely hot.

6. A wooden box, ten inches deep and eleven inches square, was filled with unsifted ashes as cold as an exposure of several weeks in winter could make them. A pint of hot ashes was thrown upon the middle of the surface and left uncovered. In eight hours all the central portion of the ashes was hot enough to fire wood thrust into it, and two sides of the box were incalescent. In twenty three hours, the bottom of the box was quite warm, the top of the ashes cool, and the sides of the box were becoming cool. A stick plunged to the bottom of the ashes, was drawn out ignited or burnt at the end, but not even charred above it. In thirty hours the bottom of the box was almost unsupportably hot; and the upper half of the ashes retained but little heat. In thirty six hours, the temperature of the ashes being much reduced, I emptied the box, and found the bottom of it on the inside near the middle converted to coal, one of the sides considerably

* Vol. xlii., p. 165, *et seq.*

sharred, and another browned by the heat. Coals were found in different parts of the ashes, but I believe they were confined to those portions through which the heat did not travel.

The ashes used in the foregoing and the subsequent experiments, were derived from the mixed combustion of hickory, beech, sugar-tree, oak, and a few other kinds of wood; and the sieve employed consisted of twenty-four by thirty-two interstices to the square inch.

To what cause could I attribute the augmentation of heat and its downward course, which the preceding instances exhibit? The plausible answer was, carbon. There, said the spirit of conjecture, was the fire, burning its way into the ashes, and leaving successive portions of them to cool after it had consumed the combustible matter out of them; travelling downward, like the Goth's descent upon Rome, into regions where its fierceness could be fed. There, too, was the *gray* color of the ashes, produced, said conjecture, by the admixture of fine carbonaceous particles with the pure white cineritious matter. To prove that the proper color of wood ashes is white, there lay the beautiful specimen with gossamer lightness upon the hearth, the residue of the undisturbed combustion of a solitary ember; showing the delicate fibrous structure of the original wood; with open avenues on every side, and a thousand apertures within for the free admission of atmospheric oxygen to every atom of carbon; the carbon thus affianced to oxygen had escaped into the air, leaving its white mansion unshaded by its presence. And how could I better account for the various shades of gray which ashes present, than by supposing them to arise from the various proportions of the black powder intermixed? And then, there were the uniform results of repeated trials by fire, in which something escaped out of the contents of the crucible; and what could this be but carbon? Such was the language of imagination before experiment had fully uttered its voice. To strengthen these conclusions, I applied myself to other evidences; but these, to my disappointment, instead of supporting, kicked against my imaginings.

7. Selecting magnesia as an article possessing physical properties somewhat similar to those of ashes, I erected a cone of this material, and at the summit buried a partially ignited coal. In a few minutes I was surprised to find the whole coal was alive with fire. Shortly afterwards the magnesia beneath the coal became ignited, and the bottom of the heap almost intolerably hot.

8. Guided by the specific gravity and the compressibility of the substances employed, I repeated the experiment with pulverized chalk instead of magnesia. The chalk soon became red hot, beneath the coal; and the base of the heap heated beyond endurance.

Thus discovering that these alkaline earths possessed the same heat-preserving properties as ashes, and that the same downward, centralizing tendency of caloric was shown in all, I was led to the conclusion that the heat eliminated and diffused in the sifted ashes was the result of the combustion of the single coal buried in them; and considering their low conducting and radiating power, it appeared probable that the amount of heat apparent was not very far from the absolute quantity generated during the combustion. In every instance, while the central parts of the cones were red hot, the exterior of the ashes, except at the apex, was cold throughout the experiment. The caloric is evolved faster than it is diffused, and of course it accumulates within a small sphere near the coal to an igniting temperature; combustible matter lying at the circumference of this sphere would ignite and generate another ball of fire, and this produce another, and so on indefinitely, or while the last ignited spheres reached new combustible matter. In this manner I conceive the caloric travelled in the fifth and sixth experiments, and I see no reason why it should not under similar circumstances circulate through a bed of ashes spread over the whole earth.

Satisfying myself in this manner that the presence of pulverulent charcoal was not essential to the phenomenon in question, I submitted other powders to similar trials.

9. Fine sand, scorified wood ashes, anhydrous sulphate of lime, common earth, all thoroughly dried, and the earth and sulphate reduced to subtle powders, were severally made the tenements of a fully ignited coal; but in spite of all the persuasion I could command, the coal refused to be buried alive in such sepulchres as these; almost as soon as it was decently interred, it expired.

PRACTICE OF ENGLISH FARMERS IN THE IMPROVEMENT OF PEATY GROUND.

By Ph. Pusey, M. P., President of the Royal Agricultural Society of England.

From the Journal of the Royal Agricultural Society of England.

Although the improvement of peat is not a subject that can be of general interest, yet, as there are large tracts of such land in the country, and as I have had the advantage of observing in my own neighborhood the mode in which it has been improved by good farmers, as well as of receiving information from members of our society who have reclaimed peat in other districts, I think it may be of some use if I endeavor to describe their various methods of management. Our science, we may hope, would gradually advance, if we could obtain faithful accounts of our actual practice upon each variety of our soil. The peat I am most conversant with, follows generally the borders of all the rivulets in this level stone-brash country. Along the margin of each sand arable farm, there runs a belt of such poor marshy ground. Long after the meadows are green in spring, these pastures retain the brown of winter: in summer they are covered with rushes and coarse grass, but are of some use for the sheep in dry weather: in autumn they soon return to their withered hue; and in winter again they are scarcely to be passed on horseback. Almost every kind of tree has been planted upon them in vain; but the birch, the alder, and the abele, not the least ornamental of our trees, I have found to grow with some vigor: they are too poor for the willow.

The first step of improvement is of course to acquire command of the water and obtain an outfall by digging a straight ditch, about 8 feet wide and 5 deep, down the middle of the hollow: this takes the place of the winding stagnant rivulet that is frequently found there. In wider bogs more of

these ditches should be dug, and one may be placed on each side so as to divide the peat from the sound land, and thus cut off the springs which ooze from the higher ground. However slight the apparent fall of the ground, it is generally practicable, by carrying along the new water-course to a sufficient length, to reduce the level of the water 3 or 4 feet permanently below the surface: this then is the first and indispensable step, the open drainage: the next is the under or close drainage: it has been done on the Deanston principle—thorough draining. The parallel drains have been cut to a depth of 30 inches in the gravel underlying the peat, the materials being tiles and broken stones over the tiles, covered with a sod 16 inches below the surface; the distance between the parallel drains varying from 20 to about 80 feet. The levels are so flat that tiles have been often necessary. It is essential that these drains should be formed before the surface is broken up, that the work may be clean for the laborers: winter and early spring will be the most convenient seasons. In Lincolnshire, however, the heavy expense of under-draining has not been required. Deep open ditches, dividing the peat into fields of 12 or 15 acres, have been found to lay it sufficiently dry.

When the draining, of whatever kind, is completed, the question next arises how the coarse and rushy swamp is to be brought into cultivation. I must say that the practice of paring and burning the surface, employed by our farmers, has been justified by its effects. As soon as the harsh easterly winds of spring have set in, the breast-ploughs are put to work, the surface is pared and turned over, and, when dry, piled in heaps and burnt to ashes. The proceeding may be defended I think on these grounds:—If the coarse sward filled with the roots of rushes were merely ploughed over, it would not decay during the whole summer, and would be far too tough and hollow for any crop that might be sown on it. Again, when a fertile well-dressed surface is burnt, the volatile parts of manure which it contains may be dissipated by fire, but on the land we are dealing with, there is no fertility to be destroyed. Lastly, the ashes which are produced are a manure peculiarly adapted for the crop which experience has taught the Lincolnshire farmers to make their first crop on such land; that crop is rape, a plant not generally grown in this country. On such ground so prepared, it shoots up with unfailing luxuriance, resembling the tops of strongly growing Swedes, but forming a dense mass of dark leaves, about a yard high, through which it is difficult to make one's way. Although peat may be well suited to the growth of rape, it is to the peat-ashes, I believe, that the chief strength of its vegetation is due. In fields where the soil is moory but not a pure peat, when they have been pared and burnt in the same manner, a singular appearance presents itself which proves this point. On the spots where the heaps have been burnt, may be seen dark tufts of rape growing in the vigorous manner already described. On the rest of the ground you can hardly distinguish the pale blue or purple dwindled plants of rape scarcely raising themselves from the surface and choked with grass. This fact illustrates in some degree the chemical laws of the food of plants; for Dr. Liebig states that peat ashes contain a small proportion of potash: I believe that the rape itself also contains potash: hence probably the wonderful influence of peat-ashes upon its growth. There is also a further circumstance which may be remarked; the quantity of ashes which thus occasions the difference between a strong plant 3 feet high and a feeble weed of a few inches, is very small; but, of that small quantity, the potash and other salts which enter into the composition of the plant, and enable it to bring forth its tall stem and broad leaves, are still more minute: the ashes cannot then be called the food of the plant; they can only aid the plant to make use of the other matters of which its vegetable frame is formed; yet they act precisely as farm dung, which is supposed to afford the substance of vegetation. Such is the fact; the explanation remains for that chemist who at some future day shall unfold to us the great mystery of the food of plants.

I have omitted to mention the manner in which the rape or Swedes are sown; and, in now adverting to it, I have to state an instance in which the knowledge of a practical farmer was better than my own theory. I had been very desirous that one of my tenants should subsoil-plough his peat land after it had been drained, in order to let down the water through the tenacious subsoil; this he was very reluctant to do, because in his opinion it could not be ploughed too shallow. He was unwilling even to plough it 4 inches deep, thinking the depth of 2 inches enough. Now it happened that in a peaty field of my own, which had just been broken up, one half of the 25 acres was ploughed 2 inches deep, the other half, contrary to my intentions, 4 inches deep. On the half which had been ploughed shallow, I found a very fine growth of Swedes; on the other, which had been ploughed deep, about 8 acres were almost perfectly bare, nearly every plant having been destroyed by the wire-worm. The looseness of the ground arising from the deeper stirring, may have rendered the progress of the wire worm more easy; but I think the true cause of the destruction was the enfeebled state of the plant, in consequence of which it perished under the attack which greater vigor would have enabled it to survive. This I believe is often the case, and certainly under the strong Swedes on the firmer land, an equal number of wire-worms was to be found. The farmers in fact here, led by experience, carry to a great length the principle of keeping such poor light ground as tight as possible. I should have mentioned that the rape is planted by sowing it broadcast on the unmoved ground after the ashes of the first breast ploughing have been spread, the seed being afterwards covered by paring and turning over another thin slice of the surface in a second breast-ploughing. On one farm, 50 acres of land, which though not peat are peaty and equally loose in texture, were broken up from grass three years ago, and have been cultivated ever since by the breast-plough alone. I did try the subsoil plough last year on two acres of peat, cutting through a subsoil of weak clay, and it appears to me that the present crop of Swedes has suffered materially by the consequent looseness of the ground, the land being but half covered with plants: indeed, although it has been thorough drained, it has returned to the state of bog, and is once more almost impassable. It is right, however, to mention that in Lincolnshire deeper ploughing is practised. Mr. Handley writes to me, "the peat is ploughed as deep or deeper than other lands. A relative of

mine has for years been in the practice, when the surface has become exhausted by cropping, of ploughing with two ploughs in the same furrow, depositing the top soil in the bottom of the furrow, and raising the subsoil from the depth of fourteen inches to the top, with most beneficial results; but if that depth was exceeded, the following crops were bad." But even there the practice is not unanimously approved, and Lincolnshire farms have been by no means exempt from the wire-worm. On Exmoor, too, in Somersetshire, I have lately seen subsoil ploughing practised upon peat by Mr. Knight with success; but there the peat, about 8 inches thick, rests on one or two inches only of retentive earth, to which its growth is owing. Below this crust a porous stone-brash is found. The wetness of the climate may also remedy the hollowness of soil produced by the subsoil plough. The shallow ploughing of our farmers seems to me to be decidedly right upon our own peaty and other loose soils.

I may mention another mode in which this principle has been applied with success for some years by Mr. Williams, at Buckland, on a light blowing sand, as it is called, as it seems to answer equally well upon peaty ground. In the common Northumberland system of growing turnips, it is well known that the ground, when sufficiently ploughed, is thrown up into alternate ridge and furrow with the double-breasted plough, that the dung is placed in the furrows, the ridges split, so what was furrow before, now becomes ridge, and the turnips drilled upon this new ridge standing, of course, over the hollow earth which has been filled into the furrow. But upon a very light sand, Mr. Williams thinking it desirable to keep the ground firm under the root, whether turnip or mangel wurtzel, proceeds in this way. The ground is ploughed first very shallow—upon peat it may be merely scarified; the dung is then spread upon the land, the double-breasted plough is used, as in the common mode, to throw up ridges; but the process is now complete, and the turnips are drilled at once on these first-formed ridges, so that, while the dung is collected round them as in regular ridging, they have a solid bed to stand on in this bastard ridging, as it may be called; and I must say that a trial I have this year made of this method with Swedes upon peat, has confirmed Mr. Williams' experience upon sand. This operation, however, which I have mentioned in order to show the leading principle acted on here by farmers in the cultivation of peat—tightness of ground—applies to a later crop of Swedes: at least in the first crop no dung could be required, the ashes being amply sufficient.

Rape or Swedes being established as the first crop, after the breaking up of peaty land, in the system I am describing, the next crop is usually oats: they are drilled in upon a very shallow furrow, with plenty of seed, and well pressed with a press-roll, as well before they are come up as afterwards, in order to guard against the wire-worm, the enemy to be feared on such land. It is remarkable that by very late sowing, as late as the end of April or beginning of May, you may be almost certain to escape the wire-worm—it is supposed, because the oat grows more rapidly out of their reach; but on the other hand it will be harvested late; and there is this further disadvantage, that the grain, which is always light on such land, will become so much lighter, that you perhaps lose in weight as much as you gain in quantity. I may observe that the oats do not ripen together upon this ground: the farmers cut them while they are partially green, because they find that, if they wait until the whole crop has changed its color, the best grains, which are those that first ripen, shed in the mowing and carrying, whereas, these are preserved by early cutting, while the unripe grains and green stalks improve the straw as fodder for cattle. This first crop of oats is generally beaten down by the weather, being weak and long in the straw, and, though not a bad crop, looks better than it really is.

On land which is not peat but peaty, some farmers grow barley: there is a large crop of straw, and it is therefore liable to be laid; the grain, too, is but thin. The advocates of barley, however, assert that a bad sample of barley is better than a bad one of oats, because thin barley may be ground or may be used for seed, whereas seed oats should be as plump as can be found. On the other hand, it has been stated to me by a gentleman residing in Lincolnshire, that "he considers barley the most objectionable grain which can be sown upon peat soil, and that its injurious effects are visible for five years."

The rape and the oats will generally have proved successful, and indeed by their luxuriance may lead one to suppose that more improvement has been made than is really the case. It is now that doubt and difficulty begin. The oats or barley are followed by rye grass, which has been sown among them, but if these have been laid, as they often are, large patches of the rye-grass will have been destroyed. Even if they have not been laid, the peaty soil will perhaps throw out many of the grass-plants by the roots in the next winter, and still more in the succeeding one, if, as is usual here, the rye-grass be left for two years. The motive for so leaving the ground two years in grass is, that it may regain solidity before it is again ploughed: still this is but a poor rotation which gives only one crop of corn in four years. On the other hand, if the ground were left permanently in grass, there is reason to suppose that in a few years the fine grasses would wear out, the coarse herbage return, and the land be no better for the expenses incurred in drainage. Nay, one farmer thinks he had observed it become worse, because the equatic grasses natural to peat no longer obtained the moisture which they require, and the better grasses do not grow well. In order to meet this evil, the gravel or rubble which has been taken out from the main drains, is spread over the ground in the winter before the oats are sown: and, however sterile and hungry be the material thus used as a manure, there is no doubt that it produces a strong effect, for the rye-grass is much thicker and sweeter where this has been done: this is called firming or weighting the land; it is good as far as it goes, but the staple of the soil is still very weak. When wheat is sown on ground that is at all peaty, it will almost certainly lose plant in large patches, even though the land has been dunged, and the young wheat has been trodden in by women, as is sometimes done in the spring. There is clearly some principle defective in the composition of the soil: that principle is cohesion, and can only be supplied by clay.

The operation of claying peat is one of the me-

thods by which English farmers have for many years been silently changing the face of the country, which now constantly come to our knowledge, but for which they have not hitherto received the credit due to them; its effect is so wonderful that I ought not to withhold a further account of it which I have obtained from Mr. Wingate himself, whose farm at Leake is mentioned by Mr. Morton:

"*Dear sir*—I will endeavor to describe to you what we have done in our east fen since its great improvement by drainage, confining myself to that land which I consider decayed vegetable matter on a clay or silty subsoil at various depths, and which had been under water generally for ages in the winter season, and getting partially dry in the summer. A great deal of wood in the first instance was taken out of it—nay, in fact, is still in many parts where the plough goes a little deep, chiefly oak, I believe, but in some instances maple, poplar, and aspens, all lying in one direction. At the time of the first enclosure, from what I hear, the land was brought into cultivation by paring and burning, sowing with cole (rape,) then afterwards oats and rye, which oats it grew of very bad quality, being very light, and I believe it nearly ruined the first class of occupiers. It had been occupied before I took it by a tenant, and had been all clayed over once at my expense. After getting it into my own hands, the first thing I did (it being very much out of con lition) was to fallow it thoroughly, and sow it with cole, and I had some very fair crops. After that I clayad it again: we usually have our clay-dikes 11 yards from the centre of each, taking off the peat and putting on the clay, 3 feet wide by 4 feet deep—a very heavy dressing being nearly 300 cubic yards per acre. After that it was sown with, 1st year, oats; 2d, wheat; 3d, cole with manure; 4th, oats; 5th, wheat; 6th, cole or turnips well manured, and then clayed over a third time the same as before; and most certainly I had very productive crops, that is, as much as 5 qrs. of wheat per acre, and from 8 to 9 qrs. of oats, all of very fair quality. I began again to clay the fourth time, but not with the same favorable results, and have only done some little over again, thinking the lands have got quite sufficient solidity; in fact, some of it is, I consider, almost over-clayed. I do not attribute my getting less produce of late years to the over-cropping of the land, but to the destructive ravages of the wire-worm. Still I do consider, on the whole, I have fared much better than my neighbors, who generally have some portion of their land in seeds either mown or summer-grassed.

Perhaps I ought to add, I have generally consumed 6 or 8 tons of oil-cake, with about 12 acres of meadow-land hay, to assist in converting my straw into manure. The size of that farm is about 100 acres. I ridged some peat land for turnips one season, with but indifferent success; and I always find the corn much better and much less infected with the wire-worm in the clay-dikes, where the land has been turned over perhaps from 3 to 4 feet in depth. We attempt very heavy rolling; tread the wheat land with men or women in the spring; but if we have cold, backward weather, all we can do appears of but little avail against the destructive insect.

I have mentioned your note to a neighbor and much respected friend of mine, one of the best cultivators of the soil I ever saw, and he falls in partly with your views of shallow ploughing. I certainly do not. It is possible in the first instance, if you put on a small portion of clay, by ploughing deep you may loose it; then I would say in reply to that, I would clay the land, and sow the crop without ploughing at all, simply well harrowing or scarifying it, then breaking it up and well mixing it. On some peaty land of wretched quality where I live, I have doubled, nay trebled, the produce by drainage and very heavy claying.

WM. B. WINGATE."

I do not quite agree with Mr. Johnson as to the application of lime in the quantity of 250 or 300 bushels per acre, although he has high authority in the theory of Sir Humphry Davy; not that I so much doubt its efficacy as fear the expense. Indeed, Sir Humphry Davy's opinion, that quick lime will dissolve peat, is now much doubted; lime, too, is generally applied not in a caustic but in a slacked state, and the advantage of burning lime for farming purposes is by many supposed to consist merely in its consequent reduction to a fine powder.

As this is a point, however, on which the farmers of one half of England, the western side, would probably give an opposite opinion to those on the eastern side, while in Lincolnshire a most important improvement has been made with clay only, and lime has been tried without any advantage, it is right that I should now mention two instances of great success effected by means of lime. For the first case, I am indebted to Dr Buckland, on whose application Sir Charles Monteith furnished to him the following account of some extensive operations on peaty land in Scotland:—

Edinburgh, Nov. 7th, 1841.

"*My dear sir*,—It is the general opinion amongst improvers of peaty soils that lime is absolutely necessary to produce a crop of grain well filled with farina; and I found from experience, in the improvement of part of my peat-meadows in view of my house, that when the first crop grown upon it was potatoes well dunged but without lime, the potatoes were found to be hollow in the heart of them and very watery, while in other parts of the meadows upon which dung was employed, potatoes of a good quality were produced when lime was employed in addition to the dung.

"The farmers in Scotland think they cannot raise good crops of grain without lime, as the greatest part of the south of Scotland is composed of new red sandstone, grauwacke, and granite, and therefore devoid of lime, which forms a very considerable portion of every fertile soil; indeed it was found that the soil in Dumfriesshire did not produce well-filled barley crops till the farmers employed lime, which they now do to a great extent, and find it equally useful for potatoes and turnip crops, which is amply testified by the farmers purchasing lime to the amount of 3000*l.* annually from my lime-quarry at Close Farm.

"You are correct in saying that a considerable part of my peat-bog improvements have been made by lime alone, and have been productive of very tolerable crops of hay. I have always considered peat more suitable for crops of grass than corn. In addition to the lime I have commonly employed 50 or 60 tons of sandy earth to the imperial acre of peat-bog.

"I have improved about 200 acres of peat-bogs, the average not worth 6*d.* an acre in their natural state, now worth fully 3*l.* A considerable part of it was very expensive to accomplish, as it was necessary to fill up large holes from which peat had been dug for fuel; many acres of it cost me upwards of 30*l.* the acre; but still this ground remunerates me for the expenditure of so large a sum, besides removing an ugly object in the middle of the low grounds in the neighborhood of my residence; every hollow, of which there were many within a mile of the house, was filled by an ugly, useless, black peat-bog.

"I do not recollect whether I pointed out to you some grass-fields that had been improved from black moor-land, by first paring and burning, and then ploughing the first season, the ground being exposed to a winter's frost, and during the next summer lay about 160 bushels of lime upon the imperial acre, and sowing out the ground in July or August with 5 bushels of the holcus lanatus without taking a corn crop. The reason why I did not take crops of corn from moor-ground generally having a peaty surface of 4 or 5 inches, was to keep it in a compact state; as I have found that soil of this kind, after bearing crops of corn and being frequently ploughed, becomes so loose and pulverized that the feet of cattle completely destroy the pasture, and that the roots of the grass are injured by the loose state of the ground. This grass-land has given me upon the average from 12*s.* to 14*s.* per acre annually, in its original state not worth 1*s.* 6*d.* The moor-ground upon grauwacke after this improvement is much more valuable than where the subsoil is sandstone.

"I have employed lime as it is practised in Derbyshire to great advantage upon the surface of moor-land; but as it requires a very large dose of lime, it can only be done where lime is cheap, as it requires from 200 to 300 bushels of lime per acre to destroy the great quantity of vegetable matter in moor soils, which it soon accomplishes, as is shown by the land being soon filled with moles, which are drawn to it by the decayed vegetable matter producing worms, the food of moles.

"In Craven, in Yorkshire, lime is employed very extensively as a top dressing even upon limestone soil. I have found that the cattle feed upon pasture well top-dressed with lime much quicker, and that the meat is much richer and better mixed, than upon pastures apparently equally productive of herbage. I remain, dear sir, yours truly, C. G. STUART MONTEITH.

"The Rev. Dr. Buckland."

It is certainly a very successful operation to have improved, at whatever expense, 200 acres of land from the value of sixpence per acre to that of three pounds. I have lately seen as great an improvement upon the property of Mr. Blake, at Upton, in West Somersetshire. The peat-bogs there lie on the slope of a hill. The mode of treatment was this:—To underdrain at depths varying from 3 to 6 feet, to pare and burn the surface, to grow turnips two years successively, dressing twice with 50 bushels of lime per acre, then to lay the land down with grass seeds to permanent pasture. The grass is let yearly at sums varying from 3*l.* to 4*l.* per acre. It is singular that in one field so treated, and afterwards watered, no trace of the peat remained in the upper part of the soil, which had become a pale-colored earth—I suppose by the entire destruction of the peaty substance. The grass on this land is sweet and close, like the turf upon chalk downs, and the land almost as firm. This land is on the same subsoil with Sir Charles Monteith's, the grauwacke or shillet, an imperfect clay-slate, which in Somersetshire, as in Scotland, is considered favorable to grass.

It is proved then, by the success of farmers generally in the fens of our eastern counties, of Sir Charles Monteith in Scotland, and of Mr. Blake in West Somerset, that peat, which by nature is the most unpromising of all wastes, can be profitably improved, and even be raised to the rank of our most productive soils. But, in order to effect this great benefit, it is considered necessary that either clay or lime should be applied to the surface—which, however, of the two is not certain. Finding this variety of practice, I have endeavored, in the course of drawing up this statement, to obtain fresh evidence in order to clear up the point. I cannot say that I have succeeded in clearing it up; but the facts which have come to my knowledge may serve as materials for future inquiry, and I ought therefore to lay them shortly before the society. It occurred to me that, as the Lincolnshire farmers, who had been so successful in the use of clay, had derived no benefit from the use of lime, the Lincolnshire clay possibly contained lime already. Mr. Cooke, at my request, sent me two specimens of clay from Digby Fen: one of these, a very strong clay in appearance, effervesced much with muriatic acid, and consisted entirely of finely-powdered lime mixed with fine sand. It contained, I believe, scarcely any true clay; it is, in fact, a strong blue marl. The second specimen contained no lime at all, some true clay, and a great deal of fine sand. Mr. Cooke stated, as I expected, that the first specimen was a much more effective dressing than the second: but I learned on the other hand from Handley that a clay resembling Mr. Cooke's second specimen had been used with great success by a relative of his own; and a clay of Mr Wingate's, which I examined three years since, certainly contained no lime at all. Lime, therefore, is not indispensable for the improvement of *some* peat. Dr. Buckland suggested to me that such peat may contain lime already; and I have since found his conjecture perfectly right in the following instance. On my mentioning to Mr. Wingate that some of the Lincolnshire clay is in fact marl, he replied that he had carted marl upon peat without benefit, but had found clay to answer upon the same peat. I asked him therefore for specimens of the two substances. The marl, which had entirely failed, proved to be a white tenacious marl, consisting entirely of powdered lime, apparently unmixed with any other description of earth. The blue clay, which had succeeded, was in fact a marl also, containing a large quantity of lime mixed with clay and fine sand. The peaty soil when mixed with acid threw up bubbles copiously; so that, as Dr. Buckland had anticipated, it contained enough lime in its natural state. In another part of the fens a white marl lies so near the surface of the peat that it is purposely brought up by the plough, and therefore forms what is locally called gray-land, a soil of known fertility in that district. I am not aware whether this peat contains lime naturally.

But although we must remain for the present uncertain as to the application of lime to peat, there are some rules which those who are desirous of reclaiming their peaty land may gather from the practice of English farmers, to serve for their guidance until further discoveries shall have been made. Peat must in the first place be laid dry by open ditches, and further, where necessary, by under-drains also. It may be pared and burned, and sown with a shallow furrow (for all farmers agree that this first ploughing should be shallow) to rape, Swedes, or turnips—sown early for the reasons already given. It is next necessary that some other earth should be laid on the peat; if the subsoil be clay, that clay should be brought up from wide trenches—if it be gravel or sand, I would bring up a portion of it, however poor it may be: if clay be near at hand, I would cart it upon the peat.

There is, however, some difficulty in carting clay upon peaty ground, for the lumps of clay must be spread on the ground and exposed to alternate frosts and thaws, expanding and contracting them, which gradually break down by the spring. The peat, however, is generally so soft in winter, that it will scarcely bear up a loaded cart, unless during a frost, so that the work is often interrupted. The clods may also be reduced by exposure to alternate drought and moisture in summer; but this is a less convenient time for carting the clay, and it must take place on the rye-grass, which is therefore lost. If spread in winter after rape or Swedes, the clay is harrowed in dry spring weather, and ploughed in with a two inch furrow, or scarified. I would on no account burn the surface again after it has been spread, because it is well known that clay once brought to the state of brick, however finely ground, never recovers its quality of cohesion.

It must be remembered, also, that there is a wide difference among clays; and, where the heavy expense of carting is incurred, it is of course important to choose the most effective clay, in order that a smaller bulk may be sufficient. Clay for this purpose should be, I believe, of the most solid and glutenous kind. However wet the place from whence it is taken, it should feel solid when rolled in the hand; if it be loose and liquid, it probably contains too much fine sand; if gritty, coarse sand.

Generally in draining, but almost always in peat draining, it is necessary to dig deep open ditches as main outfalls for the water. The strand or clay thus thrown out, should not be left in a high ridge, but should be spread by wheelbarrows over the peat land in winter. The steep banks, however, of a ditch five feet deep will crumble in year by year, and, unless the water-course be constantly cleared, there will arise some obstruction. But in Scotland, as Mr. Morton informs me, there is a very neat practice of shelving back the banks from the water's edge by a gradual slope of 15 or 20 feet into the field, so that the new level of the water-course is thus placed for ever beyond the chance of neglect; and if the field be arable, the plough works down to the very brink. The appearance of this Scotch practice is exceedingly neat, and its application to peat land is, I see, very easy.

REPORT TO THE STATE BOARD OF AGRICULTURE,

ON THE AGRICULTURE OF PRINCE GEORGE COUNTY.

At a meeting of the Prince George Agricultural Society, on July the 4th, the following report was submitted by the committee previously appointed, and adopted by the society, and a copy ordered to be sent to the Corresponding Secretary of the State Board of Agriculture.

It is with the most unfeigned gratification, that your committee have seen the legislature of our native state, by the appointment of a State Board of Agriculture, at last *begin* to move in this great and all-important matter. Agriculture is universally admitted to be not only the main-spring of all other interests, but the very basis of all permanent power and prosperity in every community; and yet the fact is notorious, that it has heretofore been utterly neglected by our government. It has not only been denied all direct legislative aid, but has been crippled and shackled by injudicious enactments, and measures of protection extended to other and opposing interests. Your committee trust that this suicidal course is at an end, that a new and brighter era is about to dawn for the cause of agriculture. Of this there is an earnest in the promptness and zeal with which the members of the board undertook the arduous labors of their appointment. Without the prospect of one cent as remuneration, or of even having their necessary expenses defrayed, and actuated alone by a sense of duty to their country, and the noble ambition of benefiting their fellow countrymen, they at once resorted to the capital, some of them from the remotest parts of the state, for the purpose of laying the groundwork of their future operations. For this they deserve and will receive the hearty thanks of every patriot. And can it be doubted that within the limits of our extensive territory, there are many such spirits willing and ready to do good, waiting only for the means of action? Let all such remember, that the means are now at hand. A *beginning* has been made. Let them respond to the efforts of the board, give them all their aid, encourage them in their arduous task, and by the good fruit which the board so supported will assuredly bring forth will our legislature in their turn be encouraged to go on in its support of agriculture. What the Highland Agricultural Society has done for the improvement of Scotland, our board, properly seconded by the societies and farmers of the state, can and will do for that of Virginia. Without further preface your committee will proceed, to the best of their ability, to report on the agriculture of Prince George county, and in doing so they will aim to follow as closely as they can the queries of the Board.

1. *Geographical state.*—Prince George county extends along the southern borders of Appomattox and James rivers, from Petersburg to Cabin Point Creek, a distance of about forty miles. On the south it is bounded by the county of Sussex. Blackwater, having its source in the vicinity of Petersburg, and emptying into the Chowan, runs through the whole extent of the county, dividing it into nearly equal parts. Baily's, Powell's and Ward's creeks, with many minor streams of the

same character, make up into its northern section from James river, and are worthy of notice as contributing with their tributary streamlets, to render the river portion of the county broken and hilly. The dividing ridge between the waters flowing into the James and those flowing into Blackwater is another important feature in the *surface* of the county, and like all the dividing ridges in lower Virginia is nearly level. Its general course is east and west, and its elevation above tide probably one hundred feet. In it or near it, all the small streams take their rise, running northward into James river or southward into Blackwater. This ridge may be not inaptly termed the back bone, and the secondary ridges or spurs, running out on each side nearly at right angles, the ribs of the skeleton of the northern section of the county. Towards James river, these spurs run out at nearly an equal elevation with the main ridge, while the ravines and creeks which separate them rapidly fall to the level of tide, so that this whole section, it will be readily seen, is varied and broken, presenting a picture of strips of level ridge land, with abrupt and steep hill sides, and separated by deep ravines. Such bottoms are generally narrow, and the spurs of the main ridge extend quite to the river bank, so that but little alluvial formation, with one or two remarkable exceptions, such as Jordan's Point and Brandon Neck, is any where found. The level of Blackwater is considerably higher than that of James river, and hence the slopes to it from the ridges on either hand are much more gently undulating. On the south of this stream, which is very sluggish from having but little fall, the face of the country may be described as level.

The few low-grounds to be met with are generally on the smaller streams in the interior. They are very limited in extent and rarely well drained. The marshes on James river lie too low to be successfully reclaimed, and are the fruitful sources of miasma, which causes autumnal diseases. In some localities, particularly favorable, these marshes have been reclaimed and cultivated for a few years, but without an exception they have been again given up to the waste of waters, from the gradual but not the less certain decay of the vegetable matter, of which all such soils are principally composed. None of the extensive swamps on the main stream of Blackwater have ever yet been reclaimed, and until by some act of legislation the stream itself is properly opened, a large amount of otherwise valuable land will for ever be lost to agriculture.

Soil.—Omitting the small alluvial bottoms just referred to, a few cases of fine neutral loam on the river, and the still more rare and restricted spots of calcareous soil, occasionally occurring along the shelf of the river bank, the soil throughout the county is either acid or a free light soil. The former occurs on the ridges, while the latter is found in the slopes, such is the case with the main ridge and all its spurs. The steep sides of these spurs as they approach the river, improve in quality, producing hickory and dogwood. The original growth of the acid land is principally short-leafed pine, (intermixed with oak on the stiffer portions,) and black-jack oak with a copious undergrowth of whortleberry bushes. The soil varies in all degrees from very light to very stiff, much the greater portion of the surface of the county, say three fourths, being light. The acid soil was originally very poor, and must have ever continued so without the application of calcareous matter. In fact such land is not now considered as worth the cost of clearing, unless accessible to marl or lime. Under culture, its product in grain was meager indeed, and after a few years contest with its vigorous crops of sorrel, it was generally turned out to put up in old-field pines. As poor as the soil was constituted by nature, however, the hand of man seems to have been actively employed in reducing it still lower in the scale of poverty. Thousands of acres after having been cleared and tilled year after year, till completely exhausted, have been given up as worthless, or in common parlance "turned out." Even the good lands which nature had located on the streams had shared much the same fate, until heart-sick and despondent, the farmer turned his eyes to the rich soils of the west, and prepared to leave the home of his fathers and the scenes of his own youthful associations. Such was the exhausted condition of the soil, and such the general state of feeling when the general and important discovery was made, that our pine barrens and exhausted hill sides contained within their own bosoms the means of their resuscitation. For one of our own citizens and farmers, we are proud to claim the merit of the discovery of the virtue, and of the practical illustration of the benefits of marl applied to our lands. This brings us to the consideration of the subject of

Minerals.—Marl was first applied by Mr. Edmund Ruffin, on the Coggins Point farm, 25 years ago. Guided alone by principles of theory in this new and obscure pursuit, he committed errors, which time and experience alone could have enabled the experimenter to avoid, which tended much to increase the existing doubts of his friends and neighbors. The highly beneficial effects of marl were not long however in developing themselves, and from that time to this it has been steadily winning its way more and more each year to the favor of all interested in the tillage of the earth. A little experience has corrected many early errors, and a greater economy of application, with greater and more certain benefit, may now every where be seen.

In vol. viii. No. 8 of the Farmers' Register, we have the concurrent testimony of a number of our best and most practical farmers on this subject. They tell us that the first crop after an application of marl is usually increased from 50 to 100 per cent. that this increased power of production in the land continues to increase annually, and that under a judicious system of farming, this additional fertility will never be lost, and that putrescent manures are both more efficacious and durable than before the marling.

Marl is found very generally throughout the county, of a quality sufficiently rich, and in localities sufficiently convenient to induce its application. Between Bayley's and Powell's creeks on the river, and in all the bottoms and ravines emptying their waters into them, it is especially found in abundance. Also on Blackwater and its tributaries. The marl which is most common, varies from 35 to 60 per cent. of carbonate of lime, generally of a blue or yellow color, and belongs to the formation known amongst geologists as the mio-

cene. On the river, in small quantities, is also found the eocene, varying from 50 to 80 per cent. of carbonate of lime. This marl is very valuable, and to a small extent has been and is still carried by water to some of the neighboring counties. The most usual mode of applying marl pursued is on the field to come into corn, and before the breaking of the land. The rate is dependent on both the strength of the land, and that of the marl, being directly proportional to the former and inversely to the latter. Land also containing much vegetable matter, as new grounds or woodland, will stand a much heavier dressing than old reduced land. On an average, 250 to 350 bushels to the acre may be set down as the usual rate. In marling pine old fields, the trees are merely belted by some of our most judicious farmers, and as much as possible of the vegetable matter allowed to rot on the land, instead of being burned off. It has been found the longer such land can be marled, before being brought under culture, the greater the benefit derived from the application.

Green-sand, or gypseous earth, is another mineral beginning to attract general attention. It is found in great abundance on the river, underlying the marl, and recently it has been discovered in several localities in the interior of the county. It is believed to be the same as the green-sand of New Jersey, except that it belongs to a more recent geological formation. This earth has been frequently described in the Farmers' Register, under the different names of gypseous earth and green-sand. Its value as a manure has yet to be fully tested. It has never been applied except to very limited extent and on very few farms, for the sake of experiment. Some of the applications have been highly beneficial to the clover crop, while others have as signally failed. It is hoped that the several interesting experiments, undertaken this year by members of our society, will shed some light on this subject.

Gypsum (sulphate of lime) is found in considerable quantities in the green sand deposites, particularly at Evergreen, where large and beauful crystals are found in abundance.

Water.—There is no lack of good water in almost every section of the county. Cattle no where suffer for want of water.

II. *General management of land.*—Here, as elsewhere in lower Virginia, before the introduction of calcareous manures, the usual amount of crops was kept up by annual clearings of new land. The introduction of a piece of new land was attended with the abandonment of a portion of the old. When brought into cultivation, so long as the soil *appeared* by its scanty returns to repay the farmer for a wretched and stinted culture, so long, year after year, was it made to produce its lessening crops. When all semblance of remuneration even had disappeared, it was then *turned out* to grow up in pines, and more virgin land substituted in its stead, to undergo in its turn the same scourging process, and to be itself impoverished without enriching its owner. Marl, the great renovater, has however produced a marked revolution. These abandoned old fields are now considered valuable land, and when marled become under good management permanently productive. Where marl is introduced, we hear no more of turning out land or of emigration to the west.

At one time tobacco was our principal market crop. After its culture was abandoned, grain next became the object of attention. The most usual system of rotation then adopted by those considered the best farmers, was one of three years—1st, corn, 2d, wheat or oats, and 3d, pasture. In too many cases, a grain crop (alternately corn and wheat, or oats) was taken every year. The scourging effects of both plans were as plainly evident as the former exhausting culture of tobacco. After 'Arator' appeared, many of his followers added a fourth year to their rotation, taking only two grain crops in the four years. With the appearance of 'Arator' may be dated the dawn of agricultural improvement in our section of the state. He had many and enthusiastic followers who adopted his enclosing and four-field systems; and although by too strict an observance of his principles, under circumstances in which they were by no means applicable, oftentimes serious injury was sustained, yet tide-water Virginia owes John Taylor of Caroline a lasting debt of gratitude.

The management on the marled or improved land lying principally in the river section of the county, and on the unmarled lands which lie principally in the outer part of the county, is so different that each section must be taken separately.

1. *On the unmarled lands.* Size of farms varies from 150 to 500 acres. Rotation generally of three years, corn, oats and grazing; in some cases a grain crop every year. The land is light, and too thin for the profitable production of wheat. The farmers find a ready market in Petersburg for their little surplus corn and oats. Their corn culture may be detailed in a few words. The land is broken up late in the spring with one-horse turning ploughs. The corn is planted in latter part of April or first of May, in checks of four feet each way, and when considered safe, thinned to one plant to each hill. The cultivation consists of ploughing three or four times with trowel hoes, alternately lengthwise and crosswise. Also the hand-hoes pass over the crop two or three times, hilling each time. The fodder is pulled and tops cut. The yield in corn scarcely averages 10 bushels to the acre. In March the oats are sown on the corn land of the previous year, and ploughed under with the one-horse mould-board plough. Sometimes a harrow is passed over the field to level it. The ploughing for each crop is shallow and imperfectly executed. With a few eminent exceptions, the spirit of improvement has not yet been felt. Little or no attention is paid to the collection and application of putrescent manures, and there is no doubt that the lands are annually deteriorating.

2. *Marled lands.*—Here your committee are gratified to be able to present a more pleasing picture. The lands are in a rapid state of improvement, better systems of farming have been introduced, and altogether agriculture is advancing with rapid strides. The farmers too have improved, as well as their lands; a necessary result. They no longer follow blindly in the footsteps of their forefathers, but each man thinks for himself, so that on every farm there is some peculiarity of management, of tillage, or of improvement not elsewhere found. The general management of land, however, is much the same. Many, if not most of these lands were once the meanest in the

county. In improving by marl, one of the main principles acted on is, to combine with the application of marl the non-grazing system. All the vegetable matter grown on the land, when not in crop, is allowed to fall and rot on it. Grazing is most studiously avoided in the beginning of the improvement. Clover is sown as soon as the land will bear it, generally with the first small grain crop after the marling. The culture of clover and application of putrescent manures are the chief means relied on to perfect the improvement begun by the marling. Until marl, the main-spring of all our improvements on originally poor and acid land, is applied, clover will not grow, and manure yields no profit, the main result of its application being an abundant growth of sorrel. Calcareous and vegetable matter are the two great instruments for improving the soil, and which have been furnished without limit, by an all-bountiful Providence.

When the land becomes well filled with vegetable matter, which it will do in a few courses of the rotation, if it is not subjected to the hoof, some farmers think that mild grazing is judicious, particularly on light or puffy soil, as serving by the trampling of the cattle to render them more compact, and also to destroy many insects inimical to the succeeding crop. The plan of not grazing has led in a few neighborhoods to the adoption of a common fence, enclosing several farms. There was one instance of ten or a dozen farms, containing together several thousand acres under one enclosure. So long as they were opposed to grazing, each farmer kept no more stock than absolutely necessary for his comfort and farm operations, and these were looked after by a little boy to prevent trespass on the neighbors. Where fence timber is scarce, labor dear, and grazing not desirable, this system is attended with many advantages. As the lands have improved, a larger supply of stock has become advisable, grazing is thought more desirable, and this system of a common enclosure is gradually abandoned.

Rotation.—The system of rotation on the marled lands most in use is that of three fields; 1st, corn, 2d, wheat, with oats on the most inferior portions, 3d, clover not grazed. A standing pasture in addition is necessary for the cattle in summer, or if without one the cattle are turned into the woods. Under this rotation, an average of 22 to 25 bushels of corn, and 10 to 12 bushels of wheat is made to the acre. There can be no doubt, that to our tide-water section, where the land is generally level, and better adapted to the growth of corn than wheat, and where a choice of markets is presented to the farmer, this rotation is admirably adapted. A rotation of four years with only two grain crops, viz: corn, wheat, clover, clover, (or if land is too thin for clover, weeds instead,) has been adopted with marked benefit, where land was very poor in the beginning. As the land improved, however, it became necessary to abandon it, for in the second year of rest the land became excessively foul. In some few cases, the famous four-field and fallow rotation, of corn, wheat, clover, wheat, has been tried, but has been found too scourging, except on the fine alluvial loams of Brandon Neck, where it is still in use on one or more of the farms. Besides drawing too heavily on the soil, the amount of land in corn annually is thought too small, in what is a better corn than wheat growing soil. On a few farms, either hilly and rolling, or well adapted to wheat culture, a rotation of five years has been introduced, with three grain crops, viz: corn, wheat, clover, wheat, clover. The second field of clover to be grazed. At Evergreen, a portion of the farm, a fine wheat soil, marled, has been kept alternately in wheat and clover for 9 or 10 years. The first crop of clover has been usually mowed, and the whole partially grazed, yet the land has greatly improved. The wheat crop however has diminished, on account of the blue grass and other vegetable pests which have taken possession of the land. The introduction of a hoe crop for the purpose of cleansing it has become necessary. Under the rotations in which fallowing for wheat is done, the average crops of corn are about 25 bushels, of wheat after clover 15 to 20, and of wheat after corn 8 to 10 bushels per acre.

Manures.—Under all these systems of rotation, much attention is paid to the collection and application of manure. All the offal of the corn and wheat crops, and frequently leaves from the woods are used for this purpose. When the farmer has not stock sufficient to trample these materials, they are often applied in a raw state, and always with benefit. On land which has been marled, the application of straw, pine beards or any vegetable matter, however coarse, has uniformly repaid the farmer for his trouble. Straw is very economically hauled on the land in return loads, at the time of hauling in the wheat to the thrashing machine. Spread over the young clover at that season, it will produce a most marked effect the following spring. With regard to the mode and time of applying manures, there is a great diversity of opinion and practice. Most commonly the manure is given to the corn crop, sometimes ploughed under, sometimes applied on the top. A favorite mode of application with some few is in the spring, on the clover or grass land to be fallowed in the fall for wheat or corn. Its advocates contend that this application is not only the most easily made, but also that, in the following crop, they receive the benefit of the manure greatly increased by the additional growth given by it to the clover or other grass. Others again prefer to apply their manure as a top dressing to wheat in the fall or winter. For this purpose they prefer manure well rotted.

Where good and practical farmers differ so widely, your committee feel safe in coming to the conclusion that though some mode of application may be more economical and beneficial than others, yet all the different modes are good. The best farmers use all diligence in the collecting and applying manures. They make it a matter of primary importance, not a mere secondary business which is made to yield to more *pressing jobs*, and put off for a more convenient season. Stock of every kind, horses, cattle, hogs, and sheep are made to increase the manure heap, and are furnished with abundant materials for that purpose. Let no farmer hesitate to carry out his manure, because he may be either too late to give it to the corn or because he may be unable to plough it under immediately. The greatest error committed by our farmers is in failing to carry out their summer-made manure. It is too

often left at the stable doors in heaps to heat and fire-fang, or spread out over the pens and yards to be drenched by every rain or exposed to the rapid evaporation caused by a summer's sun. In either case it will sustain a heavy loss, whereas, if carried out as made, and applied to the clover, it will add 50 to 100 per cent. to its growth, which when turned under together with the manure remaining unappropriated, would produce a degree of benefit far exceeding that accruing from the same bulk of manure after months of waste and exhaustion in the barn yard. Such is the practice on a few farms, and its good effects are very apparent.

Preparation and tillage of crops.—For corn the land is broken in the fall and winter or early spring, with two and frequently three mules to the plough, from 5 to 8 inches deep according to the depth of soil. Shortly before planting, the land is well dragged with heavy harrows, and the rows laid off 5 or 5½ feet apart. The corn is dropped in the row from 10 to 36 inches apart, and at the proper time thinned to one stalk to the hill. Some farmers cover their corn with the harrows and when the land is not very foul this is a cheap and excellent plan. It covers the corn effectually and leaves the land in fine tilth. As soon as the corn is well up, a furrow is backed off from the row on each side, by a one-horse mould-board plough. The hoe-hands follow after, weeding and thinning. The next operation is to reverse the furrow, throwing the earth to the corn with the same plough, and breaking up the entire balk. The cultivators follow to level the land. Such is the usual mode of corn culture, and is usually finished by harvest time, though in wet and backward years it is found necessary to pass the cultivators again over the corn, and also the hoes over the foulest parts, after harvest. Some of our farmers from the hilliness of their lands prefer the use of the trowel hoe and level cultivation. These, to keep their corn fields in order, find it necessary to plough early and often. Capt. H. Cocke, of Evergreen, has introduced the use of the two-horse turning plough in the culture of corn, and when the grass has once the start, it is the most ready way to check its progress. Fodder is usually pulled and tops cut for long forage, and about October 1st, the cutting up of corn is commenced for seeding wheat. In sowing wheat on corn land two different modes are pursued. Most farmers plough the land first with two horse ploughs 4 or 6 inches deep, and harrow in the wheat, while others sow on the hard surface and plough under with one horse ploughs, usually harrowing afterwards to level. The same remark applies to sowing oats in the spring on the portions of the corn land deemed too thin for wheat. The latter practice, it is believed, is rapidly giving way to the former. Those farmers who fallow for wheat, commence that operation as soon after the 1st of August as possible. The ploughing is done effectually 7 or 8 inches deep, and the vegetable matter well covered. They aim to complete the ploughing by the 20th of September. The land is well dragged both before and after the seeding. The first gives a good seed bed, the last covers the grain. Grips or water furrows are opened where deemed necessary for properly draining the field. Bedding land for wheat is not usual, except where the fields lie very level. The mountain purple straw wheat is without an exception preferred. From the 5th to the 25th of October is considered the safest time to sow; though wheat sown as late as the 10th of November sometimes does well.

The wheat crop with us is frequently much damaged by the fly, and sometimes almost destroyed by rust, though it is not more liable to these evils than elsewhere. Corn is a much more certain crop. The chinch bug is a formidable pest to both wheat and corn, as was witnessed in the years, '38 and '39, but is fortunately of but rare occurrence.

The *price* of corn is very variable. The average of late years, is believed to be 55 cents per bushel. That of wheat 110 cents per bushel. Oats are only made for consumption on the farm.

Grasses.—The only grass cultivated to any extent is clover, which is considered an invaluable aid to marl in the improvement of land. The seed is generally sown on land in wheat, in the latter part of February, on all the improved lands, at the rate of one gallon to the acre. Clover is also found to succeed very well after oats, in which case the seed is not sown until March. The following fall twelve months, the clover is turned under for wheat or corn. A bushel of plaster of Paris to the acre, where sown the second spring, has been attended with marked effects. Also a dressing of 40 bushels of greensand to the acre, but success is not uniformly met with in either case. The clover, when good, is frequently cut the second spring for hay, though the chief long forage relied on for stock is the fodder, tops and shucks of the corn crop. Clover hay is frequently much damaged by too much exposure to the sun. As far as practicable it ought to be cured in the shade. The plan adopted by those who have been most successful is to cut the clover when free from dew or rain water, and as soon as it wilts to throw it into cocks about 4 feet in diameter at the base, and 4 or 5 feet high, where it is left until cured. About the third or fourth day it is ready to pack loosely in a hay house or open loft. Cured in this way, the hay is made with little trouble, not much risk, and retains both its leaves and blossom, and the green color of its stems, and is eagerly devoured by stock of every description.

Several efforts have been made to grow herds-grass, but have not been attended with full success. The cause of failure is believed to be the fact that the land in the first place is not sufficiently cleansed. To lay down a meadow in herds-grass, it should first be cultivated in corn or some hoe crop two years or more, until thoroughly purged of all weeds, briers, and other pests. If then well drained, and sown at the rate of one bushel of seed to the acre, there can be no doubt of success.

In many places excellent natural grasses occur, which are converted into very good hay.

Draining is too much neglected by even the best of our farmers. Small strips of low grounds on almost every stream are seen, which might be the source of a handsome yearly revenue if properly drained and set in grass, but which now remain neglected, to breed disease and mosquitoes. Even some of our high lands are still suffering from surplus water. This evil is now beginning to be attended to, and will in a few years be re-

medied. Our farmers have heretofore been entirely engrossed with the very important matter of rendering their soils calcareous. As this great task is completed, more time and attention is devoted to other branches of agricultural improvement. The great benefit of draining is illustrated at Cawson's, the farm of Mr. John Meade, where the product has been increased from three to seven barrels of corn per acre, by no other process than that of freeing the land of all excess of water.

Live stock.—Our county is emphatically grain-growing. A few surplus lambs and veals are sold, and old oxen are converted into beeves, but no animals are raised expressly for market. Not enough hogs are raised to supply the home consumption, and we are mainly dependent on the west for our supply of mules and horses. This is a matter which ought to be corrected, and which, it is believed, is in the course of correction. Much more pork is now raised in the county than even five years ago. The neat stock are of the indifferent, though hardy native breed. Some attention of late has been paid to the improvement of both cattle and hogs, by the introduction of animals of a superior breed.

For many years we have been exempt from any general and disastrous diseases amongst the stock.

Dairy management.—No revenue of moment is drawn from this source. Every farmer makes enough butter for his own use, and some few make it to sell. This, like many other matters, has heretofore been neglected, because, in undertaking the improvements which are even yet in their infancy, it was impossible to attend to every thing. Our farmers, therefore, very judiciously turned all their attention and devoted all their energies to matters of most importance. The means of maintaining good stocks of cattle are already greatly increased, and we doubt not, in a few years, that the dairy will be a fruitful source of profit.

Implements.—For breaking land, the McCormick plough is a very general favorite. Parker's thrashing machine is considered decidedly the best in use amongst us, and the only obstacle to its universal adoption is its cost. Hussey's wheat reaping machine has been introduced on one of the Brandon estates, but owing principally to its inability to work when the wheat is damp from rain or dew, no material advantage has yet resulted from it.

Obstacles to agricultural improvement—1. Whatever tends to divert into other channels labor or capital which would otherwise be employed in farming, is an obstacle to the advancement of agriculture. In the southern portion of the county, the getting of staves, timber, shingles and lumber of every variety, for all of which Petersburg affords a ready market, engages the attention of many of the farmers, and occupies time and labor, which they would otherwise be forced to devote to their farms. On the river, in like manner, the early profits as well as the irregular life of the fishermen induce many smaller proprietors to neglect the culture and improvement of the soil.

2. The country stores which are licensed by court are too often little else than tippling-shops. They serve to attract the idle and dissipated, to corrupt our negroes, and not unfrequently become the receptacles of stolen goods.

3. One of the main obstacles to improvement is the want of free intercommunication of ideas and opinions between farmers. We often see the most important operations managed differently by different farmers, and of course with different results. Now there must be a *best* way for doing every thing, and it is the interest of every farmer to find it out. Agriculture, in comparison with other sciences, labors under the great disadvantage that often a series of years are required for the performance of the simplest experiments. Take for example the subject of rotation, and from three to six years must elapse before the advantages of a particular rotation can be tested, and as many more for them to be fully confirmed. In chemistry or natural philosophy, on the contrary, as many days or perhaps as many hours would suffice for the settlement of the most important principles. Hence no one man can ever expect in an ordinary lifetime by himself, and depending on his own exertions and resources, however ample they may be, to perfect or greatly improve any system of agriculture. How is this difficulty to be remedied? By giving each farmer all the advantage of the experience of his brother farmers. The best means of effecting this would be the organization of properly constituted agricultural societies throughout our land. Every farmer should become a member of such society, and furnish his mite of experience for a common fund for the advantage of all. If every county had its society, and there existed a free correspondence and interchange of views and opinion between them, each member would be benefited by the experience of every other farmer in the state.

4. The last and most important obstacle to agricultural improvement, to which your committee will refer, is the want of governmental aid. The fact is notorious that our legislature has heretofore done almost nothing for agriculture. While such has been the case here, it has been far different in some of our sister states. The legislatures of the New England states, of New York, Pennsylvania and Ohio, actuated by more enlarged views, have all taken this important subject in hand. Under their fostering care agriculture in their respective states has advanced with the most rapid strides. Like effects follow like causes, and here as there, could the same action be induced, the same result would certainly follow; and have our farmers no right to expect such action? It is an axiom universally admitted that all the burthens of society rest finally on the shoulders of the producing class—the farmers pay all the taxes, they bear all the burthens of government. And what, it may be reasonably asked, has government done for the farming interest? Is it not strange, in a country purely agricultural, and where all power rests with the cultivators of the soil, that in the legislative hall the agricultural is the only interest unprovided for. Laws are enacted for the benefit, and agriculture taxed in support of the commercial, mechanical, and worse than all, the paper bank system. Colleges are instituted and universities endowed to educate the lawyer and the physician, but ask for so much as an agricultural school or experimental farm and the idea is scouted from the hall. Farmers of Virginia! This should not be so. It is your fault rather than the fault of your legislators. The people must first move. Bring about the right feeling at home, and the legislature will yield ready obedience.

Much can be done by our legislature in aid of agriculture. All unnecessary burthens must be removed. Due encouragement must be given to the formation of agricultural societies. The Board of Agriculture must be fostered and furnished with the means of extending its usefulness. An agricultural survey, as conducted in Massachusetts, would be attended with the happiest effects. Agricultural schools and pattern farms, established in different sections of the state, would be highly beneficial. By judicious legislation, the country might, in the course of a few years, be cleared of many vegetable pests which individual exertions can never eradicate. On Blackwater and other similar streams lie thousands of acres of now useless swamps, which by the concerted action of all the proprietors could be made fertile and valuable land. This can only be brought about by legislation. The law of enclosures, a good and wise enactment, and one well suited to the country at the time of its adoption, has, by a change of circumstances, become a grievous burthen, and needs alteration. Much time and expense is now annually devoted to making and repairing fences which would otherwise be devoted to the improvement of the soil.

All of which is respectfully submitted.

THE APPOMATTOX LANDS OF PRINCE GEORGE COUNTY.

[The following notes were prepared by request of the committee by one of its members who is a proprietor and cultivator in the small section of the county described, and which section has a peculiar character, and being almost isolated, is but little known except to its residents, and was not embraced in the foregoing general report. These notes were not sent in until the report had been adopted by the society, and when the action and authority of the committee were at an end. The secretary of the society has therefore sent it with the report, and it is here appended.—Ed. Far. Reg.

This part of the county lies between the Appomattox river and City Point road from Petersburg as far as Broadway, which is four miles above City Point. The formation of the country is beautiful. The range of hills which leave the river above Petersburg, and at the foot of the falls, approach it again below Athol, (a distance of five miles) forming nearly a semicircle. They contain within their enclosure a bottom of perhaps three thousand acres, to the soil of which it is difficult to give a general designation, being sandy, mulatto, and pipe clay alternately. Of this nearly the whole is in cultivation, for the fences are kept up and fuel is supplied from the woods of the neighboring hills. From the hill or hills the land is an inclined plane to the east, for a mile or more, varying very little. Though the surface water, finding no natural vents, accumulates in many of the lowest places, and these are (very improperly) called swamps. High land and low land is every where well supplied with springs of the purest fresh water. Pine, oak, gum, chestnut and cedar are, I believe, found in abundance. The good timber for houses has long since been consumed in Petersburg. No reasonable fear can be entertained that there will ever be a scarcity of wood for fencing and fuel, as the quick growth of the pines forbids it. I have been told by a gentleman near me that he has sold the successive growths of pine from the same piece of land three times since he owned it. Within the bounds assumed I do not think more than one-third of the land is cultivated. Petersburg is a good market for corn-shucks and hay, consequently the cattle are few and small. Few horses are raised, and only four persons have sheep, and their flocks are small. No disease among the cattle prevails here.

As the object of the society is to know the available means of improving the land in each section of the county, I shall confine myself to that only, leaving all other subjects of inquiry to those members of the committee who are generally acquainted with the county, and who must be better informed on them than one who is comparatively a stranger.

Marl has not been found above City Point, nearer than two or three miles, (in this county.) We have several reasons to be satisfied with our location, from the low price of oyster-shells and the success which has attended the application of lime to every soil in this part of the county. Mr. Herbert Whitmore's farm, and Mr. Marius Gilliam's, have in a few years put on a new face, and land that was thought worthless, is now well set in clover, and the crops of corn, wheat and oats are four or five times what they would have been under the old plan. Shells can be bought in Petersburg for 37½ cents the hogshead, (18 bushels,) or one dollar delivered on the farm, and on the spot they are to be burned. Three hogsheads will lime a little more than an acre at a peck to 36 square yards. They lose nearly a third in burning. On that beautiful but neglected little farm, Mount Airy, the property of Mr. Nolting of Richmond, shell lime applied in 1828, and the land cultivated by tenants every year since, can now be plainly seen in the superior size of the crop. Some of the members of the committee know the fact that manure is cheaper in Petersburg than in any town in the Atlantic states, and that six loads of manure can be paid for by a load of wood, the wood and the manure being hauled by the same team, going and returning. A farmer finds a ready market, at a fair price, in Petersburg, for every thing that is food for or can add to the comfort of man or beast.

Draining is another means of improvement which I deem it proper to mention. A sub-stratum of pipe-clay or fuller's earth underlays most of the county east of the Broadway road, which prevents the rain water from sinking, and on the surface there are few natural vents, the land being level, consequently the water accumulates in the lower places, which are improperly called swamps, and are thought to be of no value. The land is soured, and when cultivated produces nothing without draining. A few years ago Mr. John E. Meade drained a piece of this kind of wet land, on the City Point road, by surface drains four or five feet at top and a few inches at bottom, across which the ploughs could easily

pass, and effected by this cheap way of draining, a complete change in the color, texture and product of the land. This land when drained produced eight barrels of corn, its product before had been three. This operation is performed by the plough. I cannot but think that these lands are well suited to grass, and have been surprised to see no artificial grasses here, and only a few small meadows of natural grass.

Minerals have not been found in this part of the county. All the earths from which the ingenuity of man has moulded pots and pans abound here, (and I make no doubt porcelain among them,) with wood as cheap as could be asked; and yet there is but one pottery in all the county. We have no manufactures. I have not yet seen a grist mill or a blacksmiths shop. Petersburg supplies us with every thing.

GRADED HILL-SIDE DITCHES.

To the Editor of the Farmers' Register.

In the February number of the Register, p. 88, I find an article headed "Scraps of farmers' conversation, by the editor." The conversation of Mr. Old I propose to notice. He is opposed to the system of graded hill-side ditches as a preventive to the washing of the land in heavy falls of rain, because they will not effect the object desired—that on a hill-side having several ditches, if the one near the top should break, the quantity of water thereby increased in the next, together with the force with which it would descend, the second would break, and, for the same reason, all the rest; consequently more injury would be done to the land than if they had not been made. He gives an instance of one of his ditches, that he had been so particular with as to attend to in person, having been broken by the lodgment of a few blades of fodder, which seems to be conclusive that the system was a bad one. If Mr. Old had given the grade and depth of his ditches, we should have been better able to form an opinion whether he had given the plan a fair trial or not; but we are left in the dark in these particulars, as well as to the distance between them and the manner his rows were laid off; whether in checks up and down the hill, or drills parallel with the ditches, or horizontally. For the last ten years I have practised the system of graded hill-side ditches, accompanied with the horizontal cultivation, as I believe with great success in preventing my land from washing. I must, therefore, ask leave to differ with Mr. Old. If our fields were perfect inclined planes, it would be a very easy matter to so run our rows as for each to bear off its own water so gently as not materially to wash the land. This, however, being far from the case, the question is, the best protection under the circumstances of the many undulations that we find in even a small field. It is the practice of many farmers in this section of Georgia to put in the necessary number of ditches and lay off their rows parallel with those ditches and cultivate the crop in drills. The argument for this practice is, that the rows, having the same grade of the ditches, will mainly bear off their own water. They forget that the natural undulations will very soon vary the grade, in fact change the direction of the water in different points of the row; it is therefore embodied and presses its way down the hill to the ditch below, drives across that and materially injures the land. The reason for the imperfection of this system is obvious. In one part of the field the hill may be very abrupt, at another less so, and at another still less. A ditch passing across all these various declinations, ascending the hollow on one side and descending it on the other to the natural eye, but by the instrument keeping the same grade. Now it is very easy to perceive, that in a parallel of thirty feet from the ditch, you would lose your grade, for the reason, that the fall, supposing the parallel on the lower side of the ditch, would be much greater where the hill was very abrupt, than where it was less than half as much so. Therefore the parallel row would be many inches out of the grade of the ditch at the steep part of the hill, and as compared with the ditch where the land was less abrupt. Hence the water would be thrown into bodies by this method of operation, to say nothing of the many smaller undulations, almost imperceptible to the eye, producing the same effect. And when once sufficiently embodied, the volume continues to increase, and it soon defies obstruction.

It cannot be difficult for any one who has ever used a level to comprehend the force of this reasoning. It has been observed, that if fields were perfect inclined planes, it would be a very easy matter to have each row pass off its own water. Now the horizontal rows form an inclined plane taking the rows together. True the direction of the plane is changed as often as the direction of the level changes, nevertheless the same grade is preserved, measuring from the top of one bed to the top of the other; therefore the direction of the plane is changed as often as you have undulations in the land. Your level being perfect, of course your inclined plane is perfect, and when you have such a fall of water as to overrun your water-furrows, it is as apt to break over on a ridge as in a valley; for the rows being level, the water remains where it fell—the inclined plane being perfect, the water passes over in a kind of sheet, until received by the ditch below, and by it borne off. To keep your level perfect, short rows will occur between your guide furrows; because where the land is most abrupt, the guide furrows will be nearer together than where it is less so, by running rows about parallel with the guide rows the place for the short rows will be indicated by the filling of the space where the land is most abrupt; the remaining space will then be to fill with short rows by the judgment of the operator.

But to the ditches. A field that is intended to be ditched should be sown in small grain, in order to have as smooth a surface to operate on as possible. The ditches should be from 75 to 150 yards apart, regulated in their distance apart by the fall of the land, and the ability of the soil to absorb water. In fields laying comparatively well, in many cases three or four ditches are sufficient for a field of fifty acres, of which the operator must be the judge. The grade may be regulated by the ability of the soil to absorb water, giving greater fall on clay lands, and less on sandy porous soils. For land having average ability to absorb water, my grade is *three inches to twelve feet*, increased or diminished a quarter of an inch, as the soil is more or less capable to absorb water. The

instrument used is the common rafter level, having a stride of twelve feet, with a plumb bob suspended from the crown by a very small cord, so boxed as to prevent the influence of the wind. The grade is indicated by a mark on the cross-bar, say two and a half feet from the crown. The grade that you may wish may be ascertained by first finding a perfect level. This is best done by reversing the ends of the instrument, until the plumb-line will stand at the same point on the cross-bar. Then place under one end of the level a block just the thickness that you wish your grade, and the plumb-line will indicate the declination on the cross-bar. I usually commence operations near the highest point of the land and in the middle of the intended ditch, and let that point divide the water, having it to run each way. By this method I encounter a less volume of water at any one point. The ditch being marked out by a chop with a hoe at each step of the level, it is opened by running several furrows with a plough, and the dirt drawn out on the lower side with weeding hoes. I prefer the ditches wide rather than deep, and concave in the bottom. A plough may pass them without inconvenience, and they occupy about the space of one corn-row. The necessary number being laid out and opened, you may proceed to lay out your guide furrows, by the mark that indicates the true level. The space between the guide furrows will be filled by running parallel rows alternate to the guide rows, the width that you may desire, for either corn or cotton, until the space is filled, finishing with short rows where they may be required, as before directed. The land is then thrown into beds by the rows, the beds opened, and the crop planted. In the cultivation, if the level is well preserved in the rows, and the water-furrows kept well open, all the water will be retained in common rains; but if the rain should be so great that the land cannot absorb it, nor the water furrows hold it, it passes over the bed in a sheet—because of the inclined plane formed by the horizontal rows—and is received by the ditch and borne off. If the grade of the ditch is a proper one, and well preserved the whole length, and properly opened and well attended to the first year, when a turf will be formed on its bank, I will ensure it not to break by the lodgment of a few blades of fodder.

The reason that hill-side ditches are in disrepute with many is because the grade is not a proper one, or not well preserved. In one part of the ditch, the grade being too great, the water passes too rapidly; in another, not being great enough, it passes too sluggishly: consequently there must be an accumulation at the point where the water moves slowest, and the volume continues to increase until the ditch is overflowed, for which the system is condemned, when the true cause is in the operator. I have seen many fields injured from improper ditching, but it has not proved to me that the system is a bad one. If Mr. Old will give us a statement of his method of operation, and cogent reasoning why the system of graded hill-side ditches is a bad one, and point out one that is better, and sustain it by incontrovertible proofs, for myself I will most cheerfully abandon the one and embrace the other.

Of one thing I am certain, that my land washes less than my neighbors' who have not resorted to the means that I have to prevent it; and I believe that many of them are finding it out, from the fact that they have commenced the system of graded ditches.

Since writing the above, I have had on my farm a very hard and washing rain, when the land was not guarded against it. Soon after the rain a field was examined that came into my possession last winter, and in the spring the necessary number of ditches had been made in it, and no attention given them since. By the way, it is a very broken field, and many gullies had been formed, across which the ditches passed as a matter of course. The crop is corn, and cultivated horizontally. I found the field well preserved. Even in the gullies across which the ditches passed, the loose dirt which fell from the ploughs in crossing them had not been washed out. I confidently expect, by filling these gullies with pine bushes, which I shall do this fall previous to sowing wheat, to have these gullies entirely filled, and corn growing on them.

My object in noticing the conversation of Mr. Old is to elicit information on the subject of preserving hilly land from washing from the heavy falls of rain, frequent in this country during the crop season, and as the gentleman condemns the system that I have practised with success, as I believe, I felt called on to vindicate it, and at the same time ask him for a better and more effectual one.

R. S. HARDWICK.

Jocassie, Hancock county, Ga.
June 28th, 1842.

CEREAL PLANTS.

Mr. Editor:—A short time back, I sent you an article on wheat and Indian corn, taken from the chapter upon the grain crops of France, in Le Bon Jardinier; I now send you the rest of that chapter.

LES PLANTES CEREALES.

Alpiste, Canary grass, Phalaris canariensis.—An annual plant resembling the millet in its culture and use. Its hay is a good food for horses and horned cattle. It should be sown thin, broadcast, in April or May, on a good light and rich soil.

Avoine, Oats, Avena sativa.—This grain presents a great number of varieties, the respective merits of which it is difficult to determine, their success and quality depend very much on the soil and climate. I will here point out the chief varieties, observing at the same time that it is only by experiments made upon his own land, that one can best judge which to prefer.

Avoine patate, Potato oat, Avena sativa turgida.—Grain white, short, heavy, having a fine husk and being very farinaceous. This variety, for many years very much sought after in England, preserves here with difficulty those qualities which cause it to be so much esteemed in that country. It is very subject to the black head, yet in many experiments, it has shown itself superior to our common oat.

Avoine de Georgie, Avena sativa georgiana.—Grain of a yellowish white, very large and heavy, having a hard husk; head very large; leaves of

considerable size; straw stout and tall but sweet and of a good quality for cattle; matures very early; it furnishes when thrashed more grain than any other variety.

Avoine Joanette, Avena sativa varietas.—Has been cultivated for some little time in the environs of Orleans on account of its precocity. It is apt to shatter, and for that reason must be cut a little before attaining maturity. Grain black and good.

Avoine de trois graines, Avena trisperma.—Thus called because its meshes are generally composed of three grains, attached to each other at the base; very productive and not difficult to suit with a proper soil; grain quite large but bearded and with a hard husk; quality not above mediocrity.

Avoine noire de Brie.—One of the best varieties, and very productive in good lands; grain short, plump and good in quality. A part of the grains are not separated in thrashing, but remain joined two together at their base.

Avoine d'hiver, Avena sativa hyemalis.—Very much esteemed, and grown in Britany and a part of the west of France, but its success is uncertain in the east and north, where the cold injures and sometimes destroys it; very productive in straw and grain, which is heavy and of an excellent quality, it matures early. They sow it in September and the commencement of October, in countries where they fear not the winter; in others it may be usefully employed. Thus in some parts of Berri, they sow it in February, and even in the last of January, which quality renders this variety more certain than the spring oats.

Avoine de Hongrie, Avena orientalis.—There are two varieties, the black and the white, entirely different from all other oats in having their heads bound up, and all the grains closely attached, and hanging from a single side, which causes it to be called the cluster oat, (avoine de grappe.) The black is extremely productive in good land; M. le Viscomte de Morel-Vindé has obtained from it the most wonderful yields and has contributed largely, by his writing and example to the extension of its culture. The grain of this oat is generally rather indifferent and light, and is apt to burn; in short on poor land I find it inferior to the common oat, despite however of its defects, its great product in straw and grain cause it to be in many places preferred above all others. The white Hungary oat is particularly remarkable for the strength and height of its straw, the grain is often even inferior in quality to that of the black variety. Yet I have for some time cultivated a sub-variety without or very rarely with a beard, the grain of which is good and nutritious. It produces fully as abundantly as the other in good land, and better than the black in bad land; both are hard to thrash and the straw is not a good food as that of the other varieties.

Avoine nue, Avena nuda.—Remarkable for its meshes composed of four or five grains hanging in a small cluster, and for its grain being without chaff, and which may be thrashed entirely clean. The product is small and the grain indifferent. M. Ardent has within a few years introduced a larger variety, a part of the grains of which, however, are not naturally without chaff. The peculiar nature of these two varieties seems to make them more fit than any others for oat meal, but I do not know that any attempts have been made to discover if such preference existed.

Grosse Orge nue, Hordeum distichum nudum.—This variety has a considerable advantage over the common barley, in the quality of its grain, which is as heavy and even more so than that of wheat, and which, at the mill, returns nearly its entire weight of flour very superior to that of the ordinary barley. This good quality would without doubt have long since rendered its culture general, had it not possessed defects equally remarkable, such as having a straw as brittle as to render it difficult to thrash it, and having the grain to become dark if the harvest is retarded by a moist spell, which does not injure the quality of the other kinds. Notwithstanding these faults, some farmers sow it in many cases in preference to any other. It is a spring variety and very early.

Escourgeon de printemps, Hordeum vulgare.—Despite the signification of its Latin botanical name, this species, spread over Germany and the north of France, is at present unknown in the most of our departments. It is the earliest of the barley, which adapts it peculiarly to late sowing, for instance the last of May and in June. It is desirable on this account and from its aptitude to succeed on poor land.

Petite Orge nue, Hordeum vulgare nudum.—It is also called *Orge nue à six rangs*, (six headed barley.) Although long known in Europe it has been but little grown until of late, when they have increased it in Belgium under the improper names of *blé de Mai* and *blé d'Egypte*, it is more productive than the *grosse Orge nue*, and its straw is taller. From many experiments in Belgium it may be regarded as an excellent grain to cultivate. It may be sown with success at the commencement of May.

Orge Eventail, Orge riz, Hordeum zeocriton.—Has the peculiar merit of succeeding on indifferent lands and in cold situations. It is well known in Germany, but little known in France. In 1818 this barley produced considerably despite the drought. The grain is very heavy and is superior in quality to that of any of the other varieties.

Orge noire, Hordeum vulgare nigrum.—This species distinguishes itself from all others as well by its manner of vegetating as by the color of its grain. According to the temperature, or more particularly according to the time of sowing, it presents one year with another very perceptible differences, sometimes producing a very good crop of straw and grain, as I proved in 1821, again not compensating one for the pains of sowing it. Experience has shown that sown in the climate of Paris, it will not grow if sown later than the 15th of April; it is best to sow it during March. If sown in the end of April or in May, the tufts keep themselves green the entire year, passing the winter and growing off in the ensuing spring. I have tried sowing it in the autumn, but it perished entirely. What appears to me most remarkable in this plant is its slowness in growing, which renders it almost biennial, and which would permit it (at least in the north of France, it seems to me) to be sown in the end of April or in May, and to serve for grazing the first and to yield grain the next. If any one should make an experiment as to this particular, it would be well to make comparative attempts with this, the

rye Saint Jean, the common rye and the late wheats.

Millet à grappe, Panicum Italicum, and *Millet commun, Panicum Miliaceum.* The culture and use of these two plants are very similar. Neither of them is much cultivated as food for man except in the middle of Europe. They require good land, rather light than stiff, and well worked and manured. They sow them broadcast, thin, and rather late, that is, after the first frosts. It is well to work and weed them. They can furnish a good green food if thickly sown. I have seen the last used thus. The straw also, particularly that of the latter, is an excellent food for beeves.

Moha de Hongrie, Panicum germanicum. Another plant of the same family, which has been for some time introduced into France and cultivated about Metz, under the name of *moha*, which it bore in Hungary. Its benefits have been set forth, in a notice published in the agricultural journals, with a little enthusiasm. Although I put faith in these results as announced in these writings, yet I must say that I have never derived such advantage. Since 1820 I have cultivated the *moha*, given me by M. de Borda. Comparative experiments with the *millet à grappe* have convinced me that it is superior to that as forage, on account of the greater number of smaller stalks; but I have obtained it vigorous and abundant but once, then upon a fertile sand, fresh and well manured. Large crops sown on chalky land of good quality have turned out but poorly. It is then, if I do not deceive myself, only on very good bottom land that this plant can be considered a valuable resource as forage. In respect to the utility of its grain, I think that it may be classed with the *millet à grappe.* I would advise the amateurs who wish to try the *moha* to sow it comparatively with this plant, and to establish between them a parallel which would turn to the advantage of the practical farmer.

Riz de Carro, or *Riz sec de la Chine, Oriza sativa mutica.*—Among the numerous varieties of rice cultivated in India and in certain parts of America, there are some which when sown in the rainy seasons succeed by the aid of that circumstance on elevated ground and without the help of inundation. These are called dry or mountain rice. The attempt to naturalize them has been frequently made in Europe, but more especially in Piedmont, where the unhealthiness of the inundated rice fields destroyed a large portion of the inhabitants of certain villages. These attempts have always been unsuccessful. The *riz de Carro*, a forward and interesting variety, alone gave some hopes of success, which however have not as yet been realized. Nevertheless, the agricultural journals have frequently announced the entire success and complete harvest obtained from the culture of this rice in many of our departments. It is necessary to inform the amateurs in the culture of rare plants that these announcements were founded on a mistake in the species of plant. I have received many samples of this supposed dry rice, and they have uniformly proved to be the *petite epeautre* (*Triticum monococum*) which is now called *Engrain* or *Aingrain* and cultivated as a resource on poor lands in parts of Berri.

To warn farmers against the mistake here recounted, it suffices that the true rices all have pendent heads, like the *Millet des oiseaux* (*Panicum miliaceum*) and the common oat; whilst the *petite epeautre* has an erect and flat head, the grains of which are placed in two rows, like the barley.

Sarrasin, Blé noir, Baralin, Bucail, Buckwheat, Poligonum fagopyrum. Buckwheat is generally a resource for poor countries and sandy lands that are cold and indifferent. It offers advantages also which might cause it to be used with profit on soils of a better nature. Its grain is very abundant, and, as is known, serves as food for man, but still better for fowls and pigeons; it is excellent to fatten hogs on, and to feed horses, while its flowers furnish an abundant pasture to bees. This plant turned in when in flower is esteemed by many practical men as one of the best of the ameliorating vegetables. The vegetation of the buckwheat is also very rapid, and it may be sown late, thus offering a valuable resource as an auxiliary harvest. They generally sow it broadcast; but when the land is very moist they throw it up into beds, because it suffers from humidity; it dreads still more the late frosts, and it is necessary that it should not be sown until the season for them is past. They use a half *hectolitre* of seed to the hectare when it is sown for a crop of grain, and an entire hectolitre, when it is to be turned under. The ashes of the stalks contain much potash. This plant flowering for a long time, its first grains fall before the last are matured, they are therefore obliged to choose a mean time between them for the harvest.

Le Sarrasin de Tartarie, Polygonum tataricum, the grain of which is inferior in quality, is more hardy and less susceptible of cold; the plant is larger, more branching and more productive in grain. It succeeds well in very indifferent lands, particularly in those of Sologne; it may be sown either earlier or later than the common variety, and requires less seed. The buckwheat cut green has been mentioned in many works as a good forage, and I have cited it as such in many editions of the *Bon Jardinier.* Although this use of it is not uncommon, and I myself have more than once fed it to my beeves and cows without perceiving any bad effect; yet it appears that we should distrust this food, for many observations have shown that if given abundantly, either in the stable or in the pasture, it will produce vertigo and other serious diseases. This effect has taken place in horned cattle and sheep. It has been recently reaffirmed in respect to the latter by M. Vuitry of Sens.

Seigle de Mars, Spring rye, Secale cereale vernum, has a straw finer and not so tall as the autumn rye; its grain is smaller, but heavy and of an excellent quality. Its culture has been much extended in the last few years. As its name indicates, they sow it in March. I have obtained from Germany a variety taller and with longer heads and rather later than that of France.

Seigle du nord is a variety of the autumn rye which is distinguished by the length of its straw and its heads, its grain is shorter and smaller, it is later and sends forth more shoots. In Saxony they sow it about St. John's day (from which circumstance it takes the name of *Seigle de la St. Jean,*) and cultivate it at once for forage and grain. They cut it as green food in the autumn, or make pasture of it until the end of winter, and in the ensuing summer they reap it for the grain.

It is not necessary, however, that it should be sown this season, for like the common variety it may be sown in the autumn and will be ready to be cut in the following summer. It is known that the common rye may like the *seigle du nord* be sown in summer with analogous results; the difference between the two kinds in this point has not been yet entirely established.

It is however perfectly well known that the *seigle du nord* is very valuable on account of its great vigor, and it deserves to be tried comparatively with our common variety, both as grain and forage. On account of the smallness of its grain and the size of its shoots, it requires one fifth part less of seed than the common variety.

Sorgho, Broom corn, Holcus sorghum.—This grain grows only in the middle parts of France, and even there offers but small inducement to its further cultivation, because it is an indifferent food, and requires good soil. They give it to the fowls, although some accounts are unfavorable to it as food for them. This plant may be used as green food. In parts of Anjou they cultivate it to make brooms of the branches composing the heads of the plants. They sow it late because it is apt to be injured by frost, and thin because it grows almost as large as maize. The *Sorgho blanc* is larger and more farinaceous than the ordinary variety, but it is later and matures with difficulty in the climate of Paris.

For the Farmers' Register.

TIME OF RIPENING OF WHEAT ON THE NORTH SIDE OF RAPPAHANNOCK RIVER, 18 MILES BELOW FREDERICKSBURG, AND ABOUT 50 MILES NORTH OF RICHMOND, FROM 1831 TO 1842.

1831. 21st June, began harvest with a few cutters—23d, with all hands.

1832. 23d June, cut early wheat—28th, began to cut purple straw in spots—July 4th, all hands in harvest.

1833. 14th June, began to cut early wheat—22d, began bearded and purple straw—24th, all hands in harvest.

1834, 20th June, began to cut early wheat—22d, began bearded and purple straw—24th, all hands in harvest.

1835. 1st July, began to cut early wheat—2d, golden chaff—6th, all hands in harvest.

1836. 22d June, began to cut early wheat—5th July, all in harvest.

1837. 30th June, began to cut early wheat—3d July, all in harvest.

1838. 19th June, began to cut early wheat—29th, a few hands cutting—2d July, all hands.

1839. 17th June, began to cut early wheat—24th all in harvest.

1840. 12th June, began to cut early wheat—19th, cut Delaware or red German wheat—22d, all hands in harvest.

1841. 28th June, began to cut the ordinary wheat, having ceased to raise early wheat.

1842. 21st June, began to cut the ordinary wheat.

It will be observed, that our harvests have generally followed one week after those recorded in the June number of the Farmers' Register. The extremes are (excepting the early wheat) in 1833 and 1840 on 22d June, and in 1836 on 5th July, an interval of 13 days.

The crop of 1831 was small—crops of '32, '33 and '34 pretty good—of '35 and '36 very bad—'37 and '38 good—'39 indifferent—'40 and '41 pretty good—the crop of the present year is injured excessively by rust, but we cannot know the extent of the injury until it is thrashed. An estate on the Potomac, where the largest crop of the county was expected, will barely, it is thought, yield its seed. Half crops, or two-thirds of crops are anticipated by the most sanguine farmers.

E. T. T.

King George, 9th July, 1842.

THE CROTON AQUEDUCT FOR SUPPLYING WATER TO THE CITY OF NEW YORK.

From the New York Tribune.

This stupendous structure is now completed, and in a few weeks, at furthest, the city will have a foretaste of the thousand benefits it is destined to confer. Our citizens may not be generally aware, that in this magnificent work they are surpassing ancient Rome, in one of her proudest boasts. None of the hydraulic structures of that city, in spite of the legions of slaves at her command, equal, in magnitude of design, perfection of detail, and prospective benefits, this aqueduct. The *main trunk* consists of an immense mass of masonry, six feet and a half wide, nine feet high, and forty miles long, formed of walls three feet thick, cemented into solid rock. But this water channel, gigantic as it is, is far from being all the work. The dam across the Croton, which retains the water in a grand reservoir, is a mound of earth and masonry, forty feet high, and seventy feet wide at the bottom, and has connected with it many complicated, but perfect contrivances, to enable the engineer to have complete control over the mighty mass of water. The river, thus thrown back towards its source, will form a lake of five hundred acres, which will retain a supply for emergencies, of some thousand millions of gallons, and also offer, as a collateral advantage, many picturesque sites for country seats, upon the woody points which will jut out into its smooth basin. A tunnel leads the water from this reservoir into the aqueduct, and eleven more of these subterraneous passages occur before reaching Harlem river, having an aggregate length of seven-eighths of a mile, and many of them being cut through the solid rock. At intervals of a mile, ventilators are constructed in the form of towers of white marble, which give to the water that exposure to the atmosphere, without which it becomes vapid and insipid: and these dazzling turrets mark out the line of the aqueduct to the passengers upon the Hudson.

The streams which intersect the line of the structure, are conveyed under it in stone culverts, the extremities of which afford the engineers an opportunity of displaying their architectural taste. Sing-Sing creek, with its deep ravine, is crossed by a bridge of a single eliptical arch of eighty-eight feet span, and a hundred feet above the stream. Its unusually perfect workmanship was proved by its having settled but one inch after the centres were removed. The view of its massive

grace, from the narrow valley beneath, is one of the most striking points upon the line. Sleepy Hollow, well known to the readers of imaginative lore, is spanned by a series of graceful arches.

The bridge crossing Harlem river has been the subject of much controversy. The admirers of magnificent symmetry and perfection, and those interested in preserving the navigation of that stream, have warmly advocated the erection of a bridge, over which the water might pass upon its regular level; while the friends of more measured economy recommended a lower and cheaper structure, to which pipes should descend and rise therefrom, after the manner of an inverted syphon. The plan finally adopted is that of a high bridge, but still with its surface ten feet below the usual grade, which falls fourteen inches to the mile. It is a quarter of a mile long, one hundred and sixteen feet above high water, and its estimated cost exceeds three-quarters of a million. Across this the water is conveyed in huge iron pipes, protected from the frost by a covering of earth, four feet deep. Near Manhattanville is a tunnel a quarter of a mile long, through the hill at that place; and its valley is crossed by pipes, descending one hundred and five feet. Clendenning valley is passed at an elevation of forty feet, and arches of appropriate size upon the lines of the streets, leave symmetrical carriage-ways and foot-paths.

We paid a brief visit yesterday to the two great reservoirs of this stupendous aqueduct. The receiving reservoir, at Yorkville, thirty-eight miles from the dam at Croton river, is in two divisions, both covering a space of thirty-five acres, capable of containing one hundred and sixty millions of gallons. It is enclosed by granite walls of solid masonry, roughly finished. The bottom of the basin is the natural soil.

The distributing reservoir at Murray's Hill, in Forty-second street, is a much finer and more expensive work. It is nearly square, and covers an area of about five acres. The bottom is made of puddled clay, as smooth, hard and water-tight as marble itself. This area is 440 feet square at the base, and is divided in the centre by a wall of granite, nineteen feet thick at the bottom, and four at the top. It is surrounded by a wall, also of granite, composed of three distinct columns of solid mason work. The outer column is five feet thick; the second six, and the third, or inner one, a lining of granite, about fifteen inches in depth, placed upon a concrete masonry, above thirty feet thick at the base. From the outside to the middle wall—the thickness of neither included—the distance is fourteen feet; and from the extreme of the outer wall to the inner angle of the third, is sixty feet—the three walls uniting at the top. At a distance of ten feet from each other, are thick cross walls with solid arches thus binding the whole into one solid, imperishable mass. From the top of the north-east cornice to the level of the street, the distance is fifty-six feet. The depth of the reservoir is forty feet; and it will contain water to the depth of thirty-six feet, or about twenty-two millions of gallons—as computed a few days since by James Renwick, Jr., one of the engineers employed on the work.

At the east end of the division wall, a well has been sunk to the depth of fifty feet, communicating with a sewer below, and forming a waste-wier for the discharge of the surplus water, when it rises in the reservoir above the height of thirty-six feet. At the bottom of the well is laid a block of granite, weighing seven tons; and still further to break the fall of the overflowing stream, and to prevent it from wearing away the stone, water to the depth of six feet rests permanently at the bottom. From the well the waste water is conveyed by a sewer nearly a mile to the North river.

The style of architecture is Egyptian—well fitted by its heavy and imposing character for a work of such magnitude. The summit of the walls around the whole area, is flagged, and will be provided with a heavy iron railing, forming a beautiful and sightly promenade, twenty feet in width. The grounds immediately around the work have been purchased by the corporation to protect it from encroachments. The receiving and discharging pipes are two in number, each about three feet in diameter. It is now nearly four years since the reservoir was first commenced, and during the working season, on an average, about four hundred men have been constantly employed upon it, besides great numbers employed in the winter season in bringing materials. During the whole time no lives have been lost by accident. Two men had their legs broken by a downfall of the banks—and this is the extent of the injuries that have been sustained. The whole cost will not be far from $500,000.

Such is a condensed but comprehensive view of this noble structure. It is now completed, with the exception of the high bridge. The bridge will occupy two years more, but a temporary pipe has been laid over the river upon the coffer-dams of the bridge, which will afford us a supply of water for two or three years, until the completion of the entire work. Its estimated cost, owing to the changes of plan, rise of labor and provisions, &c., has risen from five to twelve millions—a great sum abstractly considered, but a trifling one compared with the benefits resulting from the work.

ABSTRACT OF PROFESSOR LIEBIG'S REPORT ON ORGANIC CHEMISTRY APPLIED TO PHYSIOLOGY AND PATHOLOGY.

From the Albion.

This paper, read by Dr. Playfair, is so excellent a review on Liebig's volume, and contains so much matter of the highest importance as relates to organic chemistry, that we are induced to give a connected abstract.

The first part consisted of the examination of the processes employed in the nutrition and reproduction of the various parts of the animal economy. In vegetables, as well as in animals, we recognize the existence of a force in a state of rest. It is the primary cause of growth or increase in mass of the body in which it resides. By the action of external influences, such as by pressure of air and moisture, its condition of static equilibrium was disturbed; and, entering into a state of motion or activity, it occupied itself in the production of forms. This force had received the appellation of *vital force* or *vitality*. Vitality, though residing equally in the animal and vegetable kingdoms, produced its effects by widely different instruments.

Plants subsisted entirely upon manures belonging to inorganic nature. Atmospheric air, the source whence they derived their nutriment, was considered to be a mineral by the most distinguished mineralogists. All substances, before they could form food for plants, must be resolved into organic matter: but animals, on the other hand, required highly organized atoms for nutriment. They could only subsist upon parts of an organism. They possessed within them a vegetable life, as plants did, by means of which they increased in size, without consciousness on their part; but they were distinguished from vegetables by their faculties of locomotion and sensation--faculties acting through a nervous apparatus. The true vegetable life of animals was in no way dependent upon this apparatus, for it proceeded when the means of voluntary motion and sensation were destroyed; and the most energetic volition was incapable of exerting any influence on the contractions of the heart, on the motion of the intestines, or on the processes of secretion. All parts of the animal body were produced from the fluid circulating within its organism, by virtue of vitality, which resided in every organ. A destruction of the animal body was constantly proceeding. Every motion, every manifestation of force, was the result of the transformation of the structure, or of its substance. Every conception, every mental affection, was followed by changes in the chemical nature of the secreted fluids. Every thought, every sensation was accompanied by a change in the composition of the substance of the brain. It was to supply the waste thus produced, that food became necessary. Food was either applied in the increase of the mass of a structure (*i. e.* in nutrition,) or was applied in the replacement of a structure wasted (*i. e.* in reproduction.) The primary condition for the existence of life was the reception and assimilation of food. But there was another condition equally important—the continual absorption of oxygen from the atmosphere. All vital activity resulted from the mutual action of the oxygen of the atmosphere and the elements of the food. All changes in matter proceeding in the body were essentially chemical, although they were not unfrequently increased or diminished in intensity by the vital force. The influence of poisons and remedial agents on the animal economy proved, that the chemical combinations and decompositions proceeding therein, and which manifested themselves in the phenomena of vitality, might be influenced by bodies having a well defined chemical action. Vitality was the ruling agent by which the chemical powers were made to subserve its purposes; but the acting forces were chemical. It was from this view, and no other, that we ought to view vitality.

According to Lavoisier, an adult man takes into his system every year 837 lbs. of oxygen, and yet he does not increase in weight. What then becomes of the enormous quantity of oxygen introduced in the course of the year into the human system? The carbon and hydrogen of certain parts of the body have entered into combination with the oxygen introduced through the lungs and through the skin, and have been given out in the form of carbonic acid and the vapor of water. At every moment, with every expiration, parts of the body are thus removed, and are emitted into the atmosphere. No part of the oxygen inspired is again expired as such. Now, it is found that an adult inspires 32½ ounces of oxygen daily; this will convert the carbon of 24 lbs. of blood into carbonic acid. He must therefore take as much nutriment as will supply this daily loss; and, in fact, it is found that he does so; for the average amount of carbon in the daily food of an adult man, taking moderate exercise, is 14 oz. which require 37 oz. of oxygen for their conversion into carbonic acid. But it is obvious, as the inspired oxygen can be removed only by its conversion into carbonic acid and water, that the amount of food necessary for the support of the animal body must be in direct ratio to the quantity of oxygen taken into the system. Thus a child, in whom the organs of respiration are naturally in a state of great activity, requires food more frequently and in greater proportions to its bulk than an adult, and is also less patient of hunger. A bird, deprived of food, dies on the third day; whilst a serpent, which inspires a mere trace of oxygen, can live without food for three months. The capacity of the chest in an animal is a constant quantity; we therefore inspire the same volume of air whether at the pole or the equator; but the weight of the air, and consequently of the oxygen, varies with the temperature. Thus an adult man takes into the system daily 46,000 cubic inches of oxygen, which, if the temperature be 77°, weigh 32½ oz., but when the temperature sinks down to the freezing-point (32°,) it will weight 35 oz. Thus an adult in our climate in winter may inhale 35 oz. of oxygen: in Sicily he would inspire only 28½ oz.; and if in Sweden, 36 oz. Hence we inspire more carbon in cold weather, when the barometer is high, than we do in warm weather; and we must consume more or less carbon in our food in the same proportion. In our own climate the difference between summer and winter in the carbon expired, and therefore necessary for food, is as much as an eighth. Even when we consume equal weights of food, an infinitely wise Creator has so adjusted it as to meet the exigencies of climate. Thus the fruit on which the inhabitants of the south delight to feed contains only 12 per cent of carbon, whilst the bacon and train-oil enjoyed by the inhabitants of the Arctic regions contain from 66 to 80 per cent. of the same element. Now the mutual action between the elements of food and the oxygen of the air is the source of animal heat. All living creatures, whose existence depends on the absorption of oxygen, possess within themselves a source of heat independent of the medium in which they exist; this heat, in Professor Liebig's opinion, is wholly due to the combustion of the carbon and hydrogen contained in the food which they consume. Animal heat exists only in those parts of the body through which arterial blood (and with it oxygen in solution) circulates. The carbon and hydrogen of food, in being converted by oxygen into carbonic acid and water, must give out as much heat as if they were burned in the open air; the only difference is, that this heat is spread over unequal spaces of time, but the actual amount is always the same. The temperature of the humam body is the same in the torrid as in the frigid zone; but as the body may be considered in the light of a heated vessel, which cools with an accelerated rapidity, the colder the surrounding medium, it is

obvious that the fuel necessary to retain its heat must vary in different climates. Thus less heat is necessary in Palermo, where the temperature of the air is that of the human body, than in the polar regions, where it is about 90 degrees lower. In the animal body the food is the fuel, and by a proper supply of oxygen we obtain the food given out during its combustion in winter. When we take exercise in a cold atmosphere, we respire a greater amount of oxygen, which implies a more abundant supply of carbon in the food; and by taking this food we form the most efficient protection against the cold. A starving man is soon frozen to death and every one knows that the animals of prey of the Arctic regions are far more voracious than those of the torrid zone. Our clothing is merely an equivalent for food, and the more warmly we are clothed, the less food we require. Were we to go destitute of clothes, like certain savage tribes,—or if, in hunting or fishing, we were exposed to the same degree of cold as the Samoyedes,—we could with ease consume 10lbs. of flesh, and perhaps a dozen tallow candles to the bargain, as warmly-clad travellers have related with astonishment of those people.* Then could we take the same quantity of brandy or blubber of fish without bad effects, and learn to appreciate the delicacy of train-oil. We thus perceive an explanation of the apparently anomalous habits of different nations. The maccaroni of the Italian, and the train-oil of the Greenlander and the Russian, are not adventitious freaks of taste, but necessary articles fitted to administer to their comfort in the climates in which they have been born; and the colder the region the more combustible must the food be. The Englishman in Jamaica perceives with regret the disappearance of his appetite, which in England had been a constant recurring source of enjoyment; by the use of aromatics he creates an artificial appetite, and eats as much food as he did at home; but he thus unfits himself for the climate in which he is placed; for sufficient oxygen does not enter his system to combine with the carbon consumed, and the heat of the climate prevents him taking exercise to increase the number of his respirations. The carbon of food is therefore forced into other channels and disease results. England, on the other hand, sends her dyspeptic patients to southern climates. In our own land their impaired digestive organs are unable to fit the food for that state in which it best unites with the oxygen of the air, which therefore acts on the organs of respiration themselves, thus producing pulmonary complaints; but when they are removed to warmer climates they absorb less oxygen and take less food, and the diseased organs of digestion have sufficient power to place the diminished amount of food in equilibrium with the respired oxygen; just as we would expect from these views, in our own climate, hepatic diseases, or diseases arising from excess of carbon, are more prevalent in summer, and in winter pulmonic diseases, or those arising from an excess of oxygen. The professor then went on to disprove the notion that animal heat is due to nervous influence and not to combustion—an error which had its origin in supposing that the combustion proceeds in the blood itself. He also showed that animal heat must not be ascribed to the contraction of the muscles, but that the heat evolved by the combustion of carbon in the body is sufficient to account for the phenomena of animal heat. He showed that the 14 ounces of carbon which are daily converted into carbonic acid in an adult disengage no less than 197.477° of heat; a quantity which would convert 24 lbs. of water, at the temperature of the body, into vapor: and if we assume that the quantity of water vaporized through the skin and lungs amounts to 3 lbs. then we have still 146.380° of heat to sustain the temperature of the body. And when we take into calculation the heat evolved by the hydrogen of the food, and the small specific heat possessed by the organs generally, no doubt could be entertained that the heat evolved in the process of combustion, to which the food is subjected in the body, is amply sufficient to explain the constant temperature of the body. From what has preceded, it is obvious that the amount of carbon consumed in food ought to depend on the climate, density of air, and occupation of the individual. A man will require less carbon when pursuing a sedentary occupation than when he is engaged in active exercise. Professor Liebig, having thus discussed the source of animal heat, proceeds next to consider what are the ingredients in the food which may properly be considered to be nutritious. Physiologists conceive that the various organs in the body have originally been formed from blood. If this be admitted, it is obvious that those substances only can be considered as nutritious which are susceptible of being transformed into blood. The professor then entered upon an examination of the composition of blood, and of the identity in chemical composition of fibrine and albumen. The nutritive process is simplest in the case of the carnivora. This class of animals live on the blood and flesh of the graminivora, whose blood and flesh are identical with their own. In a chemical sense, therefore, a carnivorous animal, in taking food, feeds upon itself; for the nutriment is identical in composition with its own tissues. He next inquired, from what constituents of vegetables the blood of the graminivorous animals is produced. The nitrogenized compounds of vegetables forming the food of graminivorous animals are called vegetable fibrine, vegetable albumen, and vegetable caseine. Now, analysis has led to the interesting result, that they are exactly of the same composition in 100 parts; and, what is still more extraordinary, they are absolutely identical with the chief constituents of the blood—animal fibrine and animal albumen. By identity, be it remarked, we do not imply similarity, but absolute identity, even as far as their inorganic constituents are concerned. These considerations showed the beautiful simplicity of nutrition. In point of fact, vegetables produce, in their inorganism, the blood of all animals. Animal and vegetable life are therefore most closely connected. The professor has still to account for the use of the substances in food which are absolutely destitute of nitrogen, but which we know are absolutely necessary to animal life. In all these we find a great excess of carbon, and but very little oxygen. By a train of admirable reasoning, he arrives at the interesting conclusion, that they are solely exhausted in the production of animal heat, being converted by the oxygen of

* A sportsman or traveller in the Highlands of Scotland knows how much more he can *whisky it*, &c., than in the south.

the air into carbonic acid and water. This portion of the report contained an ingenious and important view of the use of bile in the animal economy, the truth of which quantitative physiology dare not deny. When exercise is denied to graminivorous and omnivorous animals, this is tantamount to a deficient supply of oxygen. The carbon of the food not meeting with sufficient oxygen to consume it, passes into the compounds containing a large excess of carbon, and deficiency of oxygen; or, in other words, fat is produced. Liebig is led to the startling conclusion, that fat is altogether an abnormal and unnatural production, arising from the adaptation of nature to circumstances, and not of circumstances to nature—altogether arising from a disproportion of carbon in the food to that of the oxygen respired by the lungs, or absorbed by the skin. Wild animals in a state of nature do not contain fat. The Bedouin or Arab of the desert, who shows with pride his lean, muscular, sinewy limbs, is altogether free from fat. And the professor points out the diseases arising from this cause, and furnishes some valuable hints to therapeutics. From all that has transpired, we may sum up the nutritious elements of food as follow. The ingredients adapted for the formation of the blood, and which the professor calls the plastic elements of nutrition, are as follow:—vegetable fibrine, vegetable albumen, vegetable caseine, animal flesh, animal blood. The other ingredients of food, being fitted to retain the temperature of the body, he calls the elements of respiration. They are—fat, starch, gum, cane-sugar, grape-sugar, sugar of milk, pectine, bassorine, beer, wine, spirits. These are Professor Liebig's general principles of nutrition. The second part of the work consists of details, in which he examines the chemical processes engaged in the production of bile, of urea, uric acid and its compounds, as well as of cerebral and nervous substance. The conclusions to which he has arrived on these subjects are of so great and startling interest, that Dr. Playfair said, he dare not venture to make an abstract of them, without entering into the calculations with which they were accompanied. In the professor's explanatory remarks on digestion, he ascribes a singular function to saliva. This fluid possesses the remarkable property of enclosing air in the shape of froth, in a far higher degree even than soapsuds. This air, by means of the saliva, accompanies the food into the stomach, and there its oxygen enters into combination with the constituents of the food, whilst its nitrogen is again given out through the lungs or skin. The longer digestion continues, the greater is the quantity of saliva, and consequently of air, which enters the stomach. Rumination, in certain graminivorous animals, has plainly for one object a renewed and repeated introduction of oxygen. The professor further touches upon the use of tea and coffee as an article of food. Recent chemical research has proved that the active principles of tea and coffee—viz. theine and caffeine—are absolutely one and the same body, perfectly identical in every respect. The action of tea and coffee on the system must be therefore the same. How is it that the practice of taking them has become necessary to whole nations? Caffeine (theine) is a highly nitrogenized body. Bile, as is well known, contains an essential nitrogenized ingredient—taurine. Now, Professor Liebig considers that caffeine goes to the production of this taurine; and, if an infusion of tea contains only one-tenth of a grain of caffeine, still, if it contribute, in point of fact, to the formation of bile, the action even of such a quantity cannot be looked upon as a nullity. Neither can it be denied, that, in case of using an excess of non-azotised food, or deficiency of motion, which is required to cause the change of matter in the tissues, and thus to yield nitrogenized matter of the bile, that in such a condition the state of health may be benefited by the use of tea or coffee, by which may be furnished the nitrogenized product produced in the healthy state of the body, and essential to the production of an important element of respiration. The American Indian, with his present habits of living solely on flesh, could not with any comfort use tea as an article of food; for his tissues waste with such rapidity, that, on the contrary, he has to take something to retard this waste. And it is worthy of remark, that he has discovered in tobacco smoke a means of retarding the change of matter in the tissues of his body, and thereby of making hunger more endurable. Nor can he withstand the captivation of brandy, which, acting as an element of respiration, puts a stop to the change of matter, by performing the function which properly belongs to the products of the metamorphosed tissues. The third part of Liebig's report treats of the recondite laws of the phenomena of motion; but as it is principally of a speculative character, we pass it over. The professor concludes his valuable communication by two chapters: one on the theory of disease; the other on the theory of respiration. The whole life of animals consists of a conflict between chemical forces and the vital powers. In the normal state of the body of an adult both stand in equilibrium. Every mechanical or chemical agency which disturbs the restoration of this equilibrium is a cause of disease. Disease occurs when the resistance offered by the vital force is weaker than the acting cause of disturbance. Death is that condition in which chemical or mechanical powers gain the ascendency, and all resistance on the part of the vital force ceases. Every abnormal condition of supply or waste may be called disease. It is evident that one and the same cause of disease—that is, of disturbance—will have different effects, according to the period of life. A cause of disease, added to the cause of waste, may in old age annihilate the resistance of the vital powers, or, in other words, occasion death; while, in the adult state, it may produce only a disproportion between supply and waste; and in infancy only an abstract state of health, *i. e.*, an equilibrium between supply and waste. Professor Liebig argues, from what has preceded, that a deficiency of resistance in a living part to the cause of waste is, in fact, a deficiency of resistance to the action of the oxygen of the atmosphere. The professor's theory may be compared to a self-regulating steam-engine. The body, in regard to the production of heat and of force, acts just like one of those machines. With the lowering of the external temperature, the respiration becomes deeper and more frequent; oxygen is supplied in greater quantity, and of greater density; the change of matter is increased, and more food must be supplied, if the temperature of

the body is to remain unchanged. It has been proved, that iron is not necessary to the coloring matter of the blood, but that it forms an essential constituent of blood-globules. These globules, it is well known, take no part in nutrition. Professor Liebig conceives that the iron is the great means of conveying to the lungs the carbonic acid formed in the system; and he has made a calculation, that the iron contained in the body could actually convey twice as much carbonic acid as is expelled daily from the system.

Dr. Playfair, to whom the public is indebted for this able summary, on receiving the thanks of the Section, (also voted to Prof. Liebig,) stated that he had prepared it for a popular assemblage, and referred the more scientific portion of his hearers to the original, for farther information.

REPLICATION TO THE REJOINDER ON THE DOCTRINE OF ROTATIONS.*

To the Editor of the Farmers' Register.

Big Lick, Roanoke, Aug. 17, 1842.

I am truly surprised that you should have evinced so little knowledge of the human heart, and so little regard for editorial popularity, in your note to the last essay of the Rev. Jesse Turner, as to have indulged the Irish hint, that his arguments so fully answered themselves as to render a reply unnecessary. It was, Mr. Editor, a most impolitic and cruel thrust, of a barbed javelin, into the sides of the redoubtable "Le Noir Faineant," which I am fearful will cool the ardor of his chivalry, and disturb the happy self-complacency with which he has heretofore regarded his prowess and invincibility. To convict *any* dialectician out of his own mouth, by adopting his logic as the very best argument against the truth of his propositions, is distressing and mortifying enough in all conscience; but when you have, as on the present occasion, a special victim, duly prepared for the sacrifice in every particular, even to the garland of flowers, a gentleman of age, experience, and reputation, ambitious of fame as a practical, self-taught farmer, whose knowledge is rather intuitive than inductive, and who, disdaining the aid of philosophers or philosophy, expects to light up the intricate paths of organic chemistry and vegetable physiology by the corruscations of his own genius, you will find the anguish greatly augmented by these adventitious circumstances, and the writhings and contortions of the hapless victim affording indubitable assurance that he is suffering the tortures of being flayed alive. I know full well that the gentleman smarts under your rebuke, and feels that you have at one blow repaid him with liberal interest for all his irony. * * * * *

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With this introduction I would now proceed to vindicate the theory of a rotation in crops, which has been assailed by Mr. Turner, and endeavor to correct the numerous errors and fallacies, which disfigure his otherwise sprightly essay; but really the assault is so feeble, that I see but little to rebuild, while his positions are shifted with so much alertness, and with such pliable consistency, that I am almost deterred from the task of heading and exposing him. I will, however, make a few suggestions by way of reply, lest the gilded speciousness of the gentleman should be mistaken, by careless observers, for the sterling bullion of true knowledge. And first let me ask, how a grave gentleman, who has undertaken to enlighten the community on the subject of agriculture, can be so regardless of the serious responsibilities of his task, as to disparage by sneers the authority of philosophers, who have done more to advance agriculture than all other men living? What shall I say in reply to that part of his essay in which he remarks, "If however, Chaptal, Sir H. Davy, Liebig, &c., can be of any service to him, he may bring *them*. But to the *Frenchmen* I positively object." Thus to strip Chaptal of his birthright as a Frenchman, after a long life of filial devotion to the glory and prosperity of his beloved France, will never do. I am satisfied he would not give up his heritage as a native of *la belle France*, if he were perfectly sure it would advance him in the good opinion of Jesse H. Turner, president of the Agricultural Society of Henrico. This, reader, is one of the important preliminaries insisted upon in this controversy by my authoritative antagonist, who affects great wrath at my intimating a disposition in him to *varnish* his theories with facts, and as it is a precious morceau, we will chew the cud upon it a while longer. As a matter of curiosity and divertisement, let us analyze it. You positively and emphatically object to the authority of *Frenchmen*,

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* When a controversy has commenced in a journal like this, and the discussion has become excited, or is beginning to wax warm, the editor is placed in a very difficult position, in which he cannot possibly so act (if aiming to act properly and fairly) as to avoid giving offence to both contending parties. He will, at the same time, offend one by what he admits, and the other by what he rejects, of each of the opponents' pieces. And even if regardless of such offence, and of every consideration but to do what is right, he resolves to prune away all personalities and unpalatable epithets, he will find them so inseparably interwoven with sound and necessary argument, that it is impossible to separate them entirely, and wholly reject the one class, without impairing the force of the other. Under such difficulties we have had already to act in regard to prior controversies which grew out of Mr. Turner's communications, and under such difficulties we have to act now. This discussion, in spite of some previous restraining on our part, (particular and remedial as well as general and preventive,) has assumed a complexion which we much regret—and the more so because of the high respect which we entertain for both the opposing parties, as individuals, and as highly valued contributors to the pages of the Farmers' Register. If Mr. Turner requires it, we must permit him to reply, and thus make even and equal the number of the passes of attack and defence. But with that, this discussion must end in this journal, unless confined strictly to the matter in question, and to principles and things, avoiding altogether what is personal or merely critical of the manner and not the matter of the argument.—Ed. F. R.

as strangers to you, but are perfectly willing to allow the introduction of a *Frenchman*, the celebrated Chaptal, who it is apparent is an utter stranger to you. Surely, Mr. Turner, if you will allow me to change my form of address from the editor to yourself, surely you perpetrated this bull voluntarily, as a modest assurance to me of your Irish descent.

Your next preliminary is equally obnoxious to criticism. You protest against my nice distinctions, and endeavor to avert the force of my arguments by confounding all distinctions. You first introduce a set of technical synonymes, illustrative of your idea, and as a sort of analogical argument, and then complain of my critical distinctions, which are introduced to show that the words used by you, have no such signification as you claim for them. In your first essay of last May, you say that *fertility* is as necessary to one crop as another, that this *fertility*, a term understood by every body, is expressed by different writers by different names. Professor Webster (you think it is) calls it humus, Professor Dana geine, and Liebig ammonia. In reply I pointed out to you the absurdity in which you were involved by this confusion of technical terms. I suggested to you, that the term *fertility* as used by you to express the great desideratum of production *for all crops* could not be synonymous with humus, because there were plants, wheat for instance, which would not thrive in a soil enriched with humus alone. I stated further, that in the pure humus soils of Brazil and in the soils of Europe formed of mouldered wood, (pure humus,) it had been found that the stalks drooped prematurely. That the assigned cause of the failure was, that the strength of the stalk is due to the silicate of potash, and the grain requires the phosphate of magnesia, neither of which substances are afforded by a soil of pure humus. These and other difficulties suggested, you have neither acknowledged nor explained, but content yourself with modestly insisting that I shall abandon all nice and critical distinctions, and allow you to use the words *fertility* and *manure* in your own way.

Having disposed of these preliminaries, the reverend gentleman looses himself from the moorings which he has hugged so closely for nearly two columns, and boldly commits himself to the rocks and waves of an unknown sea. The instinctive law of self-preservation, however, soon comes to his relief, and the flag of distress is unfurled. He protests against being treated as a "long, low, black, rakish, piratical-looking schooner," and denies flatly that he is opposed to every kind of rotation, or even attempted when it was undefended to founder it. But here the gentleman resorts to one of those "*ruses du guerre*," of which he discourses so approvingly. He erects a man of straw that he may display his valor in knocking it down. You totally misapprehend me, Mr. Turner, if you suppose that I for one moment thought you so blinded by your theory as to discard hoed crops as cleansers. That was not the character of my objections, nor does the distinction claimed by you in the present instance, though you are in general a foe to all distinctions, blunt the point or weaken the force of a single argument which I have advanced in support of rotation. As to Mr. Ruffin's views on this point, I leave him to speak for himself. Your position, as defined in the first piece, was that you saw no objection to a succession of the same crops on the same land, provided there was fertility enough to sustain it. That you had no great faith in any rotation from which regular supplies of *manure* were excluded, and that it made little difference what the successive crops were, provided there was a constant supply of enriching materials equal in amount to the crop which was removed. To this I replied, that it was a common observation of farmers in this quarter, that when lands are worn down with long-continued and severe cropping so that their yield in grain is not worth the labor of cultivation, they will produce a luxuriant crop of clover. That not less common is the observation that old tobacco lots, when they grow tired of the crop which they have borne for a long succession of years, and refuse to produce the same heavily, however well cultivated or highly manured, can only be restored as tobacco lots by a rotation. Let us see now how the learned president meets these facts in his rejoinder. He sets out by premising that he "knows a thing or two" of the region where these examples are located; that it is a limestone region of exuberant fertility, to which clover is so natural that he has seen it growing luxuriantly in the woods. He considers clover as more congenial to the Roanoke lands than the grain and tobacco crops, and hence accounts for its vigorous growth on lands which will produce nothing else. But can it be possible that he satisfied himself with an argument so utterly inconclusive and unsatisfactory? The experience of my neighbors, General Watts, Mr. Whitten, Mr. Oliver, and indeed of every observant farmer of my acquaintance, is that old tobacco lots often refuse to produce tobacco, when they are extremely rich and capable of producing heavily, wheat, corn and every thing else except the particular crop of which, in common parlance, "they are said to have become *sick*." Does the gentleman's rejoinder meet these facts? The casual observer must see at once how utterly he fails to resolve the difficulty. It is so glaring that it would be a useless waste of ink to dwell upon it. But the ingenious gentleman is wofully gravelled by another fact given by Liebig, who states that a Göttingen farmer planted all his land in wormwood, and so exhausted the soil of its potash that it refused to produce grass for several years. The gentleman not happening, as in the Roanoke case, "to know a thing or two" of Germany, and the clover theory not fitting, with more boldness than discretion, seizes the bull by the horns, and says that "it proves just nothing at all." But hold, Mr. Turner, not quite so fast. Round assertions and bold assumption, without proofs or arguments, won't do. Grass, you say, is not wormwood, of course it was a change, and you can't conceive why a rotationist should refer to it as authority; nor can you conceive why worm-wood should incapacitate land from bearing grass. If you had read Liebig, whom you so *modesty* deride, with more care, you would have had your difficulties removed, and saved yourself this exposure. He would have taught you that wormwood exhausted the land of potash, which is indispensable to the growth of grass, and you would then have seen that it was a legitimate argument in favor

of a rotation which would thrive on those ingredients of the soil which were not exhausted, till the potash could be restored. But tossed as the redoubtable knight was on the horns of the Göttingen bull, he had hardly regained his feet, when, nothing daunted, he throws down the gauntlet to one of the proscribed Frenchmen. I had stated in my reply, upon the authority of Liebig, that Macaire-Princep had proved by experiment that beans wither in the water in which the same species have grown until the excretions colored it brown, whilst corn plants grow vigorously in the liquid, and the brown color diminishes sensibly with the growth of the plant. I explained it by the fact that beans fed largely on the phosphates, while corn requires scarcely any; and I then ask if it is not clear that at the time the liquid was rendered unfit for the support of beans, it still retained a capacity for producing corn, and that this corn actually fed on the exudations of the beans? And how did you respond? What were the means employed by you to extricate yourself and theory from the dilemma in which you were involved? Let me beg of you, reader, before we advance a step farther, to contemplate for a moment the embarrassing predicament in which the agile Frenchman has placed the Henrico champion. With the Frenchman's small sword run directly through his vitals, and pinned against the wall, he looks for all the world like a preserved subject of entomology—a position which I am sure you will at once admit to be singularly striking and picturesque. In this attitude of constraint and disadvantage it would be unreasonable to expect a very vigorous or efficient defence, or indeed any resistance at all. Instead however of yielding unconditionally, and magnanimously acknowledging himself a dead man, he resorts to another of those "*ruses du guerre*," for which he expresses such unqualified admiration. He sees it is idle to contend against the Frenchman's small sword, and he enters a solemn protest against is use; denounces it as illegitimate, as too slender, too sharp, too elaborately polished, and too difficult to be parried. But to drop the figure, for I can't reconcile it to my feelings of humanity to keep you exposed in your impaled condition, longer than is necessary: to be plain, then, you object to the inference from this experiment of Macaire-Princep, because you class it with those experiments of the learned which you term fooleries! This, it is true, Mr. Turner, would be a very summary and perhaps admissible mode of disposing of the facts, if the blow had been dealt by the giant arm of a Newton, but * * * * The experiments which satisfy the philosophic mind of Macaire-Princep, and which are endorsed by the searching and vigorous intellect of Liebig, and which are concurred in by the scientific world generally, to be unqualifiedly denounced by the Rev. Jesse Turner as fooleries!! Surely, Mr. Turner, you must be a bad illustration of your own theory of the salutary influence of age in begetting caution and *modesty*. Your loose, boyish observation, of the successive crops of cotton in your mammy's cotton patch, behind the kitchen chimney, is to be received as a fact to influence this interesting question, (and I didn't object, as far as it went,) while, forsooth, the labored and carefully digested experiments of the first philosophers of the age are to be decried and cast aside, as the dross of learning and the fooleries of science.

A few more remarks, and I will bring to a close what I have to say by way of replication to Mr. Turner's rejoinder.

Mr. Turner says he has made his strictures upon my reply "with no unkind or *even* indignant feelings," as though he had indulged a most creditable and undeserved forbearance towards me. This claiming credit for not being indignant at my reply, in which I endeavored studiously to avoid every thing calculated to wound, and, to make "assurance doubly sure," appended in a note some very complimentary remarks to him, was the first indication to me of the temper and feelings which had impelled his pen. I had not proceeded much farther, however, before the cloven foot was distinctly visible. Entering the field of conjecture, he says he is not certain, but he suspects I am a *young* man, and makes it the occasion of the following very polite and complimentary reflection: "I like," says he, "to see ardor and boldness in youth, but the gentleman will excuse me for saying that these qualities usually give place, in after age, to *caution* and *modesty*." I am sure my old schoolmates, the Messrs. Selden of Westover and Hanover, whose sensible contributions to agriculture I have the pleasure of reading occasionally, but whose faces I have not seen, but for a moment, in the last twenty-five years, will be greatly surprised to find me metamorphosed into a youth. I am only sorry that the suspicion of the gentleman is not better founded, and that he should have thought it necessary to assume the fact to create the insulting inference of pertness, forwardness and impudence in my assault upon his theory. It was a poor salvo to say that the style of my reply evinced the "scholar and gentleman," when you had discharged upon my head the vials of your wrath and ridicule. After your gratuitous consolation, that I would improve in modesty as I increased in years, you complain of my doing you injustice in several particulars. This complaint, however, being utterly groundless, and adopted by you merely as an apology for your unwarrantable strictures, requires no other reply than the scriptural injunction, that you should take the beam out of you own eye, before you complain of the mote in mine.

W. M. PEYTON.

SORREL APPARENTLY NOURISHED BY MARL.

To the Editor of the Farmers' Register.

August 24th, 1842.

My attention has lately been called to a fact, which has surprised me very much, so much indeed as to make me very desirous to hear your opinion on the subject, as well as that of some of your correspondents who have most experience in the use of marl. The fact is this: my nephew, Mr. R. M. T. Hunter, has been marling his land for two years past, to a considerable extent, and nearly all the piles deposited during the winter and spring months were covered by midsummer with a luxuriant growth of sorrel! This has happened both years on each of his two farms, although the field on one of them, upon which the marl was deposited this year, has no

sorrel on the greater part of it, except upon the marl heaps.

The universal opinion, I believe, is that marl will kill sorrel; but here is a fact which has been witnessed by many, that appears directly and undeniably to disprove it. Can it be possible that the same substance can produce and nourish a particular species of plant, the seeds of which must either have been blown upon the mass by the winds, or deposited therein from time immemorial; and yet destroy these plants when ploughed into the earth wherein they previously grew? To me the matter seems altogether incomprehensible. The fact admits of neither doubt nor contradiction—it is absolutely certain; for there were the piles of marl, hundreds of them to be seen for weeks together, covered with luxuriant sorrel, which continued to flourish, until the marl was spread and ploughed in. Do let us hear what you think of this matter; and continue to believe me, yours, very sincerely,

JAMES M. GARNETT.

[As we had given an answer to a similar inquiry formerly, which has been forgotten by our correspondent, and never seen by much the greater number of our present readers, we beg leave to republish it, together with the inquiry and statement of facts which drew it forth.]

Williamsburg, Jan. 15, 1833.

* * * * On a recent visit to my farm, one fact struck me with considerable surprise, as it seemed to be inconsistent with one of your leading principles respecting calcareous manures. The marl which I am now using is very strong, supposed to contain $\frac{75}{100}$ of lime, and is in heaps of from four to five bushels. On these heaps I observed sorrel was growing in bunches of considerable size. Will you have the goodness to account for this fact? It seems to me that I can never get clear of sorrel by the use of marl, since it grows on a marl bed. Your experience, however, may explain this effect, and assist my future use of the manure. * * * * *

Answer by the Editor.

* * * * My own experience, more than ten years ago, furnished me with several opportunities of observing facts similar to those you describe—and, like yourself, I was alarmed at first, at what seemed to be a positive contradiction of my previous opinion, that calcareous manures in sufficient quantity rendered a soil incapable of supporting the growth of sorrel. But further observation served to remove these fears, and even afforded additional proof of the general position before assumed. Where I found sorrel growing on heaps of marl, it was under these circumstances: the loads had been dropped on acid soil (subject to produce sorrel) and had remained without being spread, perhaps twelve months. By carefully removing the marl from the plants, I found that they had sprung, not from the marl, but from the acid soil below—and that the communication between the soil and the air, where the leaves opened, was through a single tap-root, which merely passed through the heap of marl, without drawing any sustenance from it. The plants were usually where the marl was thin, near the edges of the heaps—but one of the roots which I examined was of the remarkable length of nine inches; it had thrown out a few horizontal fibres of about an inch in length, as if in search of nourishment, but which were then (some time in June) quite dead. The few plants then observed, though full of the coverings for seeds, yet were quite destitute of the seeds which should have been within: but this remarkable abortion, though often to be seen under like circumstances, is not general.

Calcareous earth alone is insoluble in water, and can in no way affect growing plants except when mixed with, and acted on by other substances in soils. A load of marl dropped on the surface of the land and left undisturbed, can have no more effect than so much silicious sand, or any other substance of like insolubility, weight and texture, though perfectly worthless and inactive as manure. Marl, if thinly spread, though left on the surface, in the course of time would have all its finer parts carried down into the soil by rains; and thus, ultimately, would act as a manure. But even this slow effect would be prevented by the thickness of a cart load of marl, which would shelter the covered soil from rain, except what it could imbibe slowly by absorption. By thus calling to your mind the existing circumstances, and the insoluble quality of calcareous earth, you will see that in no way could your marl exert its chemical power of neutralizing the acid quality of the soil; by which means only it destroys the growth of sorrel. The germination of the seeds at such depths, and the rising of the plant through such a layer of dead earth, (as marl is in such cases,) proves the remarkable hardiness of sorrel; but its growth in such situations furnishes no proof whatever, that marl when acting as a manure is not destructive of sorrel. To produce this effect, it only requires that a sufficient quantity shall be applied, and equally and thoroughly mixed with the soil by tillage. If plants of sorrel are found on a field that has been sufficiently marled, and the soil well stirred by cultivation, it only proves that from careless spreading, those spots were left without their share of the dressing. But should my reasoning be not entirely satisfactory, you may rely on the testimony of my experience, which pronounces that sorrel will never be found plenty enough to be injurious after even a moderate marling, and that after a proper application, "the soil is found not only cleared of sorrel, but incapable of producing it."

* * * * * * *

Since answering your letter, I have examined many plants of sorrel growing in my heaps of marl which were dropped last year on a poor broom-sedge field. Contrary to my former opinion, I found that the slender horizontal roots stretched through the marl, sometimes eight or ten inches, and were alive early in the spring. But by the middle of June, they were either dying or dead. In one plant only, I found that a horizontal root after passing nearly a foot through the marl, had struck the soil below, and had become nearly as large as the main tap-root. These roots, so long as they are altogether in the marl heap, instead of drawing support for the plant, are themselves sustained by its juices, drawn through the main root from the acid soil. In every case, the only im-

portant fact is uniform—namely, the principal root of the sorrel being fixed in the soil below the heap of marl.

BUFFALO CLOVER.

The following was a postscript to an already published communication from Col. E. T. Tayloe, of King George, and which was laid aside until the information asked for could be obtained. The plant was the indigenous kind called Buffalo clover, which we have seen growing rarely and sparsely on the sandy low-grounds of Appomattox, a little above the falls, and elsewhere on soils of but moderate fertility. The specimen sent was shown to Mr. M. Tuomey, and pronounced to be the *Trifolium reflexum.*—Ed. F. R.

"I send a specimen of clover, of which a luxuriant growth sprung up after a dressing of plaster last spring. What kind is it? If you can do so, describe it in the Register, and give the name. I have seen it in some portions of my farm where red clover has not been sown, but not before in the part where this specimen grew—it dries up much earlier than the red clover, and though the foliage is less, it must be an improver. E. T. T.

THE GENESEE VALLEY.

From the New Genesee Farmer.

The river Genesee rises among the high lands of Pennsylvania, in the neighborhood of the Susquehanna. Winding its way among the mountains it enters New York by the southern side of Allegany county, passes into Livingston county, which it divides longitudinally nearly in the centre, and after traversing the whole breadth of Monroe county pours its rich tribute into Lake Ontario. At its ordinary level it presents an average breadth of only a few rods. Its course is remarkable for its windings and doublings. It has some rapids; and it has at least six considerable falls, all within New York, of remarkable picturesqueness; and at high water of singular beauty and grandeur. Its rapid torrents, its brilliant cascades, its sweeping and in some cases its terrific floods, and its lofty and precipitous walls rising for a considerable length of line to a height of 400 feet, and presenting, in some instances, perpendicular cliffs of 600 feet, are objects of attraction to men of taste, the geologist, and the curious traveller. In these respects they are surpassed in the northern United States only by the world's wonder, the giant of the waters, Niagara.

The river, after successive leaps and rapids, soon after leaving Allegany county, at Mount Morris, becomes a quiet and in low water a sluggish stream, bordering on each side meadows and alluvions of large extent and eminent fertility. At the village of Mount Morris the river may be said to enter the Genesee valley. Here the flats begin, forming an extensive region of alluvial meadow, surrounded by hills of medium elevation and of easy and gradual ascent, presenting an expanse of an average width of more than two miles, as nearly as the eye would enable me to judge. A large portion of this land is cleared and under cultivation. It was to a degree cleared when the whites first came into the country; and was a favorite resort of the Indians, whose judgment directed them to select the most fertile as an instinctive taste led them to spots the most picturesque and beautiful. A considerable portion is still occupied by a deep and dense forest of extraordinary magnificence. The parts which are cleared are adorned, or perhaps it might be properly said left with excellent taste, as they were adorned in their original condition, with here and there a single tree of beautiful proportions, sometimes a belt of considerable length, and at other times a clump equally as grateful in their shades as they are exquisite in their form and foliage. The largest tree that has ever come under my observation, is an oak on the meadow of Mr. Wadsworth in Geneseo, being full eight feet in diameter, standing out in its majesty as the contemporary of other generations and the mute historian of departed centuries. Under its shade the imagination naturally reverted to days gone by and to the changes which have transpired during its long reign. The wild children of the forest, who were accustomed to gather under its spreading branches to celebrate their rude festivities or hold their councils of war, have all departed; and the quiet and rejoicing herds, marking the progress of civilization and humanity, repose securely around it. The council fires are extinguished; the deadly arrow no longer rustles among its boughs; and the war-whoop and shrieks of vengeance, which once filled these valleys with terror, have given place to the songs of harvest-home and the gentle and peaceful undulations of the village bell. Every where among these meadows, clad in a verdure of surpassing depth and richness, and waving with their golden harvests, cultivation has triumphed over the rudeness of nature, and art and skill and taste display their brilliant trophies.

It was once asked, what was the use of rivers, and the reply was, to feed canals with. Acting upon this assumption, the state has penetrated the whole of the Genesee valley, from Rochester to Dansville, with a canal, and availed themselves of the waters of the Genesee river to fill its banks. The line of passenger boats on this avenue are of the best description. The canal from Rochester passes for some distance through an uncleared forest of extraordinary growth, until presently it emerges into a highly fertile and cultivated country, and for its whole distance to Mount Morris, as far as we pursued it, intersected an agricultural country as rich as the eye could rest upon, and dotted all over with flourishing villages and the abodes of rural wealth and independence. Nothing seems wanting to render the picture perfectly enchanting but an expanse of water; and if nature had seen fit to spread out in this valley a lake like that of Canandaigua or Seneca, the imagination would have had no difficulty in recalling all the beauties and splendors of the primeval state.

The soil.—The soil of the country varies somewhat in different places, but is throughout strongly aluminous and calcareous. On the meadows or flats it is alluvial and full of vegetable mould, the washings and gradual deposites of the hills, and so

clayey as to be used with advantage for bricks. In some cases, on the uplands, it is so strongly clayey as to be cold and heavy, and unfavorable to any grain crop and difficult and discouraging in the cultivation. The best soils are undoubtedly those of a gravelly nature, with clay enough to render them tenacious, and full at the same time of small and finely comminuted stones, which are supposed to be limestone, though as well as I could learn no exact chemical analysis has been made in any case. This kind of soil prevails in Wheatland, Caledonia, York and other places, and is eminently productive. On Mr. Wadsworth's farm in Geneseo, I found a marly substance composed of lime and clay, which readily effervesced with acids, indicating the presence of carbonic acid. In the hilly portions of Mount Morris, the crops were later than in the valley region, but promised most abundantly. Here, it was stated to me, no lime is found. These lands, however, have been much more recently brought under cultivation than those which I have before adverted to. The best crop of wheat which I found in my whole journey, though by no means the most extensive, that which promised best in respect to its evenness, cleanness and fulness, was in this part of the country, on the farm of James Conklin of Mount Morris. It was of the red chaff variety. None of these soils as yet, however, exhibit any diminution of their product, though in some cases the cropping is severe and often without manure.

Crops.—The crops cultivated in the county are almost wholly wheat, oats, and grass. Wheat every where predominates, and is the article on which the farmers mainly depend for their cash returns. On the alluvial meadows herds-grass, red top, and various natural grasses prevail: on other lands, subjected oftener to the plough, clover is mainly cultivated.

Of all the crops, wheat claims the principal attention of the farmer. The average crop, as rated almost unanimously by the intelligent farmers whom I consulted, does not exceed twenty bushels, which is certainly very much below what the land is capable of producing. Where the error or deficiency lies, if error or deficiency exist, is not readily perceived; but if possible it is most desirable that it should be ascertained. The quantity per acre of seed sown is about 1¼ or 1½ bushel, and the general practice is to wash in brine, and lime the seed before sowing. The time of sowing is from the first to the 15th September. One or two farmers spoke of the advantage of putting in their seed the last part of August.

Much larger crops are sometimes obtained, and I saw several fields of large extent, which might safely be put down at thirty bushels per acre. Mr. Sheffer, near Scottsville, one of the earliest settlers in the country and the owner of a magnificent farm originally of 700 acres, in Monroe county and intersected by the canal, in the early settlement of the country obtained from forty acres of land in a single field, 2500 bushels of wheat, which was at the rate of 62½ bushels per acre. Within a few years, Mr. Hall, in the centre of Wheatland, on 12 contiguous acres of land, obtained 648 bushels, or 54 bushels per acre. A neighbor of his, Mr. Blackmir, obtained in one case 68 bushels per acre.

Not having had the pleasure of an introduction to either of these farmers, I could not ascertain what particular circumstances of soil or culture enabled them to produce crops so extraordinary. No such results are matter of accident, or, as it is often termed, luck, and must in a great degree depend on some peculiar superiority in the condition, cultivation, or management of the soil. The best cultivation in England and Scotland produces 50 and 60 bushels of wheat to the acre. Now there is no circumstance connected with our climate, soil or condition, which should prevent the wheat farmers in the Genesee valley from producing as much as can be grown by any farmer on any land in the world; and the difference between 20 and 50 and 60 bushels in the produce of a field certainly deserves all consideration. The crops of Wm. Garbut of Wheatland, whose farm, for its condition and crops, strongly attracted my attention, usually average twenty-five bushels per acre. There certainly is no reason why our friends Garbut, or Harmon, two of the best farmers in the country, should allow themselves to be outdone by any farmers in any country.

Mr. Harmon of Wheatland, has taken great pains in the cultivation of wheat, and made experiment with several kinds of wheat, having cultivated them separately with a view to ascertain their comparative times of ripening, their hardiness, their proof against or freedom from injury either by insect, rust or mildew. He is still pursuing these experiments with great care. At the Monroe Agricultural show he exhibited twelve different kinds in grain and in sheaf, with a view to attract the attention of the farmers to this important subject. He has now growing several of the bald and bearded varieties, among which are the Talavera, the Provence, the Virginia May, the red chaff, the Hutchinson, and the Crate, besides others; and of the comparative result he has kindly promised a full account.

He desires me likewise to say, that if farmers will apply to him for seed, they may rely upon that which is clean and genuine. I can have no doubt that this warranty may be entirely relied on.

Oats are here a remarkable crop. I have never seen heavier crops any where. The oat usually cultivated is the common branching oat, and weighs 32 pounds per bushel, and yields ordinarily forty bushels and upwards per acre. I saw one field of the Tartarian or horse mane oat, so called from the panicles hanging all on one side. This I think was at the Shaker settlement in Groveland, and in their cultivation usually yielded from 40 to 60 bushels per acre. The largest growth of the common oat I saw on the rich meadows of Mr. Cuyler, in Leicester; they were nearly five feet high throughout the field. Their yield, though it must be matter of conjecture, would probably not be less than 60 to 80 bushels per acre. But by far the best field of oats which came under my notice, was on the well managed farm of R. Harmon in Wheatland. It was the Scotch potato oat, weighing ordinarily 44 lbs. per bushel, and must yield a very large crop. This oat is said to degenerate after the first year's cultivation. It would be well to inquire what occasions this degeneracy.

The amount of seed sowed is 2¼ bushels per acre. Mr. Harmon informed me that in one instance he obtained 40 bushels from 15 quarts sown. I found some farmers who were accustomed to sow three bushels per acre. The black

oat is sometimes cultivated, but I know no advantage which it has over any other.

Rye appears to be scarcely cultivated here. I saw in my journey only one field. Where as much wheat can be obtained as rye, from the same extent of land and with no greater expense of cultivation, the superior value of the wheat product leaves no ground for hesitation as to which to choose.

Barley.—Of barley I saw many fields, and some very heavy. The average yield stated to me was 28 bushels. Wm. Garbut, of Wheatland, gives me as the average product of his fields, forty bushels. He sows the double in preference to the four rowed barley, and considers one bushel of barley as food for any stock, equivalent to a bushel of corn. Some extensive fields on the Genesee flats must yield more than forty bushels to the acre. The breweries in the country formerly created a large demand for barley, but the progress of temperance has greatly abated this demand.

Peas.—Peas are considerably cultivated, and under successful management yield forty bushels per acre. This, however, is an extraordinary yield. They are mainly cultivated for stock, the grain being quite equal to corn for sheep, and the haum, when well saved, is as nutritious and as much relished as any long feed which can be given them. A pea called the grass pea I found growing in two instances, in the one for the use of bees, for which purpose it was sown broadcast and much esteemed; in the other, as matter of experiment, in order to ascertain its yield and its value. It did not promise much.

Indian corn.—This may be considered as a rare crop in the Genesee valley, and the cultivation of it inferior. Mr. Wadsworth gave it as his opinion that the average yield was not over 25 bushels per acre; but Mr. Bond, an experienced and intelligent farmer, stated that with good cultivation fifty and seventy-five bushels per acre might be had, and he had himself known instances of 116 bushels per acre. Indian corn is evidently not a favorite, and is fairly distanced by its great competitor, wheat. There may, in the condition of the market and various local circumstances, be good reasons for this; but when the value of the grain and the value of an acre of well-cured corn fodder are both considered, when sheep, or horses, or horned cattle are kept, I believe that the corn crop deserves much more attention than it receives.

I was surprised at the statement of Mr. Brooks of Brooksgrove in Mount Morris, that corn, to use his own expression, will not grow there upon newly cleared land, even when it has been burnt over; and that the land must be sometimes under cultivation before a crop of corn can be produced. This is contrary to almost universal experience in other places, where newly cleared and burnt land is considered highly favorable to corn. I am at a loss to account for this, but I cannot demur to so high authority. Large crops of wheat are obtained here. The growth is principally oak on the high lands, with some sprinkling of hickory; on the lower and moist lands we find much rock maple and elm.

Potatoes are not largely cultivated. They are valuable for seep; but the present prices of pork and beef give no encouragement to their cultivation for swine or cattle. That potatoes are much more valuable for sheep and cattle than ruta baga, I have no doubt; but as many bushels are not usually obtained on the same extent of land; and the care of preserving and the cost of seed, and the labor of harvesting favor strongly the cultivation of ruta baga in preference.

Esculent vegetables—In so hasty an excursion through the country and so superficial a view as was in my power, it would be presumptuous in me to speak with confidence on any subject connected with the husbandry of the country, or think to afford much knowledge in relation to it. I can only say that I saw but a single instance of the cultivation of esculent vegetables for stock. This was on the farm of Mr. Garbut in Wheatland, who had several acres in carrots, beets and mangel wurtzel. I must leave it to some other occasion to discuss the pros and cons in relation to this matter.

Of *flax*, I saw only one field, and that at the Shaker village in Groveland. It appeared well. The habits of this industrious people, who, as a general rule and as far as it can be done, produce and manufacture all their own clothing, lead them to the cultivation of flax, which is in a great measure abandoned by other farmers. This crop I am persuaded might be cultivated to advantage by many farmers. Where 300 lbs. of lint and fourteen bushels of seed can be obtained to an acre, and this is not uncommon under good cultivation, the crop will yield an ample compensation for its expense.

FOREST TREES.

From the Cultivator.

It must be a subject of astonishment, to observe the wonderful intermixture and seemingly inseparable connexion between both moral and physical good and evil—to see that the same thing which we at one time dread with abhorrence, at another time, and perhaps under a little different circumstances, becomes a subject of pleasing admiration. We often hear heart-rending tales of the gloomy and dismal forest, and yet to a person of good taste, there are no charms in the compass of nature's works, surpassing those of the forest.

The emigrant to a unsettled country, looks upon the trees as so many savage enemies, which he must conquer and exterminate before he can hope for the enjoyment of peace and tranquillity. When other emigrants settle around him, and they begin to direct their united efforts towards arriving at a state of civilization, they see nothing in their mind's eye, but cultivated fields, with meadows and pastures, with all the stumps eradicated, and not a single cluster of trees to interrupt the view. If a single patch is left for firewood, it is often sneered at, as it is cheaper to buy wood than to devote the ground to its incumbrance.

But the population increases, perhaps becomes a city. The demand for firewood increases, and timber is wanted in all the various departments of ship and house building, and every patch of forest vanishes before the footsteps of cultivation, like patches of snow before the vernal sunshine, until, as is the case in some countries in Europe, and even in some parts of this country, every piece of timber has to be brought from great distance, if not even imported from a foreign country, and coal dug from the earth for fuel.

In this state things, sober reflection, which though a slow, is often a correct teacher, shows us by costly lessons what it would have taught before, had it been consulted, that if, instead of wastefully destroying and exterminating the forest trees, they had been used with prudent economy, when necessary, and skilfully managed and preserved when not, they might have contributed largely to pleasure and to profit. The same follies have been extensively committed by other nations; but they have long since discovered their error, and are in many instances setting us examples, worthy of imitation, in retrieving it. If we profit by their example, it is still in season to avoid the error in many parts of our extensive dominions, and where it has been already committed, we can by a judicious course do much towards making amends in our own days, and avoid entailing on posterity a vast amount of unnecessary trouble and expense.* The clearing of a country of forest trees produces, no doubt, atmospheric and meteorological changes more or less connected with health; but we choose to leave that part of the subject to those who are professionally the guardians of health, and to speak of it only as it relates to the common comforts and conveniences of life.

The use of forest trees to which we refer, are for shade, for fuel, for timber, and for protection against wind.

Of shade trees, both for timber and ornament, we have indigenous a greater variety than any other nation. It would be useless to attempt forming a catalogue, but a few may be worthy of particular notice.

As an ornamental tree, the sugar maple—*Acer saccarinum*—for avenues or the streets of towns, stands unrivalled; the wood, valuable in the arts; maple orchards a profitable investment.

Yellow locust—*Robinia pseud acacia*—a most valuable timber, much in demand for mill cogs, ship trunnels, fence posts, etc.

Shellbark hickory—*Juglans regia*—ranks with the first class of our forest trees; timber of great strength and elasticity; wood, as an article of fuel, unsurpassed; produces delicious nuts; the trees worthy of cultivation for their fruit alone; the nuts may be increased to twice their usual size by cultivation.

White oak—*Quercus alba*—timber in high repute; accommodates itself to almost any soil.

Chestnut—*Castanea*—attains a large size, prolific in valuable sweet nuts, susceptible of great improvement.

White elm—*Ulmus americana*—a general favorite, often reaching an altitude of 80 to 100 feet. feet.

Black larch—*L. pendula*—for timber or picturesque effect, worthy of cultivation. The tree much neglected.

White ash—*Fraxinus americana*—the wood in great demand for farm implements, by the wheelwright and carriage maker. The pines and firs add much to the beauty of home, and for bleak and exposed situations form a good shelter. The balm of Gilead fir—*A. balsamea*—a beautiful evergreen; and the white pine—*P. strabus*—the king of its genus; its beautiful stately form will add much to rural embellishment.

A stranger travelling through almost any part of the United States, would think he had met with the strangest anomaly ever presented. He would have heard, no doubt, that the Americans were a people of refined taste, awake to all the beauties, not only of nature, but of poetry and romance; and yet, perhaps, in a day's ride, passing the dwellings of the rich and poor, he would scarcely see a tree connected with a house for beauty or for shade, much less the rich and elegant groups of trees he would have anticipated finding. To such a traveller from almost any other civilized country, to see a decent country house standing like a hay stack in a meadow, the conclusion would be that its inhabitants, whatever fame might have reported of them to the contrary, were as destitute of taste as those animals of the meadow that fed upon the hay stack.

There is nothing in the compass of inanimate nature so interesting as trees. They speak a language to the heart which none but a heart of utter insensibility can fail to understand. They awaken to recollection the memory of scenes long past, not only in the innocent sports of childhood, but often those of deeper interest. It must be noticed by every observer, that even the brute creation feel a veneration for trees. A tree is a house, furniture; it may be made clothing and even bread: "It forms part of almost every implement and every machine by which the genius of man has taught him to lighten the labor of his hand. There is that in a tree, considered as an individual work of the Creator, which may well excite our attention, and most amply reward our study."

For fuel, and more especially for timber, economy alone, without the aid of good taste, would, if consulted, be sufficient to plead for the preservation of forest trees.

But when the folly has been committed, and its consequences are beginning to be sensibly felt, what remedy can be applied, if not to afford immediate relief, at least to prevent posterity from suffering by its effects? The still small voice of common sense, confirmed by the examples of several nations of Europe, points to the remedy. The first step is to establish nurseries, where all the most valuable trees could be obtained at moderate prices; a few would avail themselves of their advantages, and the force of example would soon excite the multitude to follow them, and in a few years, those who lived to see our dwellings, which now stand as unornamented as milestones, tastefully surrounded by beautiful trees, and their value doubled in the eye of most purchasers; they would see our public roads lined with extensive rows of valuable trees, and last, though not least, our farm houses would be sheltered in their situation from bleak and destructive winds by belts of the pine and fir trees, and their cattle and sheep would find protection in winter, and places of repose from the sultry summer heat.

MAGNOLIA.

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* Massachusetts is doing her duty. Among her state premiums is noticed one for the most extensive forest of any sort of trees suitable for timber, raised from the seed, not less than 1000 trees to the acre, which shall be in the most flourishing condition, and more than five years old in September, 1845, $50.

Another premium of forty dollars for the best plantation of oak or other forest trees, suitable for ship timber, not less than 1000 trees per acre, to be raised from the seed, which shall be in the most thriving condition, and more than three years old in September, 1847.

REPORT TO THE N. JERSEY AGRICULTURAL SOCIETY, ON RUST AND MILDEW.

From the American Farmer.

The regular quarterly meeting of this society was held in Princeton, on the 23d ult., the president, *Caleb Smith Green*, in the chair. The president reported that both the trials made by Capt. Lavender and himself, to germinate the grass seed from Peru, had failed of success.

Mr. Green, from the committee appointed to investigate the cause of, and to report the best *preventives* against rust and mildew of wheat—read the following report on that important subject, which was ordered to be filed and published.

Mr. President.—Your committee, in their endeavor to investigate the subject of mildew and rust on wheat, and what may be in some measure preventives, will first present to your consideration some circumstances which have occurred under our observation, to show that it is not in the power of us short-sighted mortals, with our puny arm, to contend against the overruling providence of God: occurrences arise which are not in the power of man to foresee, govern or control. In confirmation of this view of the subject we present the following cases.

One of our farmers had an extraordinary piece of wheat, which he thought out of danger, it was so near ripe. On a very hot day, between the hours of one and three o'clock there came a small cloud over, which completely drenched the field of wheat. A deathlike stillness succeeded; the cloud passed away; the sun shone intensely hot. The owner in this state of the case, went to examine the wheat, as it was much pressed down by the shower; he immediately observed a continual ticking, or snapping noise in every direction in the wheat. The straw was fine and bright, but upon examination he perceived it bursting in short slits of a fourth of an inch long, and the sap exuding in thousands of places. A day or two after, the whole field was darkened with rust and the wheat of very little value. It does not appear that these circumstances take place while the wheat is growing, but only at this critical state of ripening.

On my neighbor White's farm some years since was one of the heaviest pieces of wheat straw I ever saw, remarkably fine, and nearly ripe. I had also a good piece advancing fast to maturity; on a close warm morning, a small cloud of fog arose from the meadow and gradually covered the two fields, but was not a general fog; being very still it remained hovering over the fields until the hot sun dissipated the vapor. Being acquainted with the above case, I was alarmed for the wheat and watched over it with deep interest. When the sun had somewhat dried the straw, and warmed it, the straw began to burst with a continual ticking noise, the sap exuding at all these little splits. In a day or two the fields were black with rust, except some small spots, which are worthy of notice. An acre or two of mine was so near ripe that the wheat was tolerable good, and the rust on this part of a reddish brown. In Mr. White's field there were some trees which kept the intense heat of the sun from the straw: there was tolerable wheat, also. The rest of the fields would scarcely pay for gathering and thrashing.

A question of importance arises on these two cases. Was this injury a fungus, the very fine seeds of which float about and attach themselves to the straw, as some of our learned agricultural writers tell us, or is it the sap of the straw that ran out and was dried on the straw, and was reddish or black according to its state of ripeness or fulness of sap?

Your committee are decidedly of the opinion that the sap being lost at this critical time of ripening is the true cause of the shrinking of the grain.

Some of our most judicious agricultural writers have taught us that the leaves of Indian corn above the ear cannot be taken off at the time of ripening without detriment to the corn, causing it to shrink in the grain.

Your committee made an experiment on this case, when the corn was nearly ripe, stripping some rows, and leaving others, over several acres. At husking time it was evident that on the rows that were stripped, many of the ears were considerably shrunk in the grain, so much so as to be loose on the cob; the ears on the rows that were not stripped showed none of those shrivelled grains, thus showing in the most satisfactory manner the damage sustained by removing the leaves above the ears.

Your committee think they are fully sustained in their conclusion on the wheat, by the parallel case of injury sustained by the corn in the removal of the leaves, which at this critical time has the only nourishment to sustain the corn in ripening. So of the wheat straw; the bottom is dead in a great degree, but from the upper joint to the ear is full of nourishment to sustain the wheat in ripening, and this is the part that suffers the loss of sap. The under part of the straw is ripe, and passed through the state in which it can suffer loss, and we often find it bright and tough at the bottom, when the top will scarcely make a band.

These two cases fully demonstrate the impossibility of any management in the power of man, always to insure a crop of wheat safe against the destructive effects of rust. Yet a kind Providence has left us so many means by which we may reduce loss, and in some measure approach to this very desirable security, that they are worthy of our attentive consideration, and practical experiment.

Mildew and rust, are more common now, than before that destructive scourge, the Hessian fly, appeared in this state. Previous to that time the wheat was sown the last of August, and the first of September, tilled largely, obtained great strength of roots, and was but little injured by winter frosts; the effect of which was to produce strong bright straw, with but few leaves, the consequence of which but little mildew and rust.

The fly having totally cut off the wheat, put the farmers on many schemes to meet this ruinous enemy. Among the experiments tried, manuring high just at seed time, and sowing late, was much depended on. But disappointment frequently followed from mildew or rust. As the wheat was often sown late in October it ought to have had three bushels of seed to the acre, instead of three pecks, or one bushel, the usual quantity then sown. Being sown so late, the plants had no time to tiller, or multiply and strengthen their roots and stalks; of course the winter weakened and thinned the plants, which made the wheat still later in the season and when highly manured the straw

was full of leaves, very succulent, usually mildewed, and almost certainly rusted—of course, a crop of small value.

At this difficult time of obtaining a small lot of wheat, one of your committee, in a conversation with an Englishman who then was a very successful raiser of wheat on Penn's Manor, fully stated the difficulties as above narrated. He considerately replied, that there appeared to be two prominent errors in the then practice—the manuring so late, and sowing so little seed.

Ques. What injury by late manuring?

Ans. Apt to make the straw very succulent and full of leaves.

Ques. What quantity of seed ought to be sown?

Ans. Increase the quantity till it fully occupies the ground, making the straw fine and but few leaves.

This short history of the difficulties, and means made use of to obtain a small lot of wheat immediately after the fly came, your committee thought might be of use in further examining the subject. It shows the progress we have made at the present time in better cultivation, earlier manuring, earlier sowing, and doubling the quantity of seed sown.

First means—The means of prevention—first a good dry, loamy soil, well prepared by cultivation, not too recently manured, that by cultivation there may be a good assimilation of manure to soil, the more complete the better. Cover the seed about two inches deep, either with drill or plough, that it may have a good hold of the soil, and not be thrown out by winter frosts.

Second means.—Quantity of seed sown must depend on the judgment of the farmer. The strength of the soil, the size of the grains, &c., must be taken into consideration. The grains of some wheat are almost as long again as some others, and some kinds tiller more than others; at any rate let the ground be fully occupied that no weeds or trash occupy the ground and fill the void spaces between the wheat, or thin places, which will be full of leaves and sap, and of course, rust. Such thin places, by unequal sowing, were observable in some fields this year, by their dingy or rusty appearance; whereas, the rest of the land sown was bright and good.

Time of sowing—As early sown wheat produces the strongest straw and fewest leaves, and not so liable to be laid with wet, nor so apt to be thrown out of the ground by winter frosts, these reasons recommend it as a preventive to rust.

At what particular time wheat ought to be sown to escape both fly and rust is not easy to settle, but should the fly cease its depredations, early in Sept., say from the 18th to the 20th, would be advisible, for the various reasons assigned above. The late sown wheat sometimes succeeds under particular cultivation and soil; still the chances against it are as ten to one.

Kind of wheat.—In a former communication your committee recommended the Mediterranean wheat as most safe. Hitherto the fly has not touched it. It has the same character at the south, as we see by the Farmer's Register,—being untouched there. This is strongly in its favor. It is also less liable to rust* than any kind we are acquainted with. But other kinds may offer, and upon trial be found preferable to the Mediterranean. The Goldenrock, now upon trial, may offer some advantages. It has a strong, short straw, not liable to get down by wet as some other kinds, and said to be of excellent quality for flouring.

Means of improvement.—We see abroad in the land and around us, among the farmers, a more certain means of improvement than any thing your committee can offer. A spirit of inquiry; a wakeful ambition to meet the difficulties of their profession; a desire to obtain the best seeds, to produce the best quality and greatest quantity of their various products; this, my friends, is the surest foundation of all permanent improvement. These hitherto dormant faculties, if kept aroused and active, will produce results in ten years from this time, that will surprise us all, for we are well persuaded that New Jersey is capable of producing fourfold what the land now produces.

* This season the Mediterranean wheat has rusted in some fields and in some spots in others; in my own field, the cold, damp, and thin spots, were somewhat rusty; upon the whole a good crop, and quite as free from rust as the white wheat.

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